

SIEMENS

SIMATIC

Distributed I/O ET 200eco Distributed I/O Device




Operating Instructions

Preface	
Product overview	1
Installing	2
Connecting	3
Configuration	4
Commissioning	5
Alarm, error and system messages	6
General specifications	7
Technical specifications	8
Appendix	A

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.


If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of this manual

The information in this manual enables you to run the ET 200eco distributed I/O device on PROFIBUS DP in DP slave mode.

Basic knowledge requirements

This manual presumes a general knowledge in the field of automation engineering.

The manual describes the components based on the data valid at the time of its release. SIEMENS reserves the right of including a product information for each new component, and for each component of a later version.

Scope of this manual

This manual applies to the ET 200eco distributed I/O device.

Conventions

Note

A note contains important information about the product described in the documentation, about the handling of the product, and about the section in this documentation demanding your particular attention.

Position in the information landscape

In addition to this manual you require the manual of the DP master system of your configuration.

Guide

This manual describes the hardware of the ET 200eco distributed I/O device. It consists of instructive sections and reference sections (specifications).

Topics covered in this manual:

- Installation and wiring
- Commissioning and diagnostics
- Components
- Article numbers
- Important terms are explained in the glossary.
- The index helps you to quickly find all texts relevant to your keyword.

Recycling and disposal

The ET 200eco distributed I/O device can be recycled due to its low-pollutant equipment.

For environmentally sustainable recycling and disposal of your old device, contact a certificated disposal service for electronic scrap.

Additional support

Please contact your local Siemens representative if you have any questions about the products described in this manual.

You will find your contact person on the Internet (<http://www.automation.siemens.com/partner/>).

A guide to the technical documentation for the various SIMATIC products and systems is available on the Internet (<http://www.siemens.com/automation/support-request>).

The online catalog and online ordering system are available on the Internet (<http://mall.industry.siemens.com>).

Training center

Siemens offers corresponding courses to get you started with your ET 200eco distributed I/O device and the SIMATIC S7 automation system. Please contact your local training center or the central training center in Nuremberg, D-90327 Germany.

Additional information about Siemens Technical Support is available on the Internet (http://www.sitrain.com/index_en.html).

Technical Support

You can reach Technical Support for all Industry Automation products via the support request Web form on the Internet (<http://www.siemens.com/automation/support-request>).

Additional information about Siemens Technical Support is available on the Internet (<http://www.siemens.com/automation/service>).

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base on the Internet (http://www.siemens.de/automation/csi_en_WW).

There, you will find the following information:

- Our newsletter, providing the latest information on your products
- The right documents for you, using the Service & Support search engine
- Worldwide forum in which users and experts exchange ideas
- Your local Automation & Drives partner in our partner database
- Information about on-site services, repairs, spare parts and more.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. You can find more information about industrial security on the Internet (<http://www.siemens.com/industrialsecurity>).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. You can find more information on the Internet (<http://support.automation.siemens.com>).

Table of contents

	Preface	3
1	Product overview	8
1.1	Distributed I/O systems – overview	8
1.2	ET 200eco Distributed I/O Device.....	10
2	Installing	12
2.1	Mounting position, mounting dimensions.....	12
2.2	Installing the I/O module	13
2.3	Installing the terminal block.....	15
2.4	Replacing labels.....	16
2.5	Removing the ET 200eco	17
2.6	Setting the PROFIBUS address.....	17
3	Connecting	20
3.1	General operating rules and regulations.....	20
3.2	Operating the ET 200eco on grounded mains.....	21
3.3	Electrical configuration of ET 200eco	23
3.4	Wiring the ET 200eco	27
3.4.1	Wiring procedures (steps).....	27
3.4.2	Connecting ET 200eco to protective earth (PE)	27
3.4.3	Wiring I/O modules with M12 connectors	28
3.4.4	Wiring I/O modules with Y-connector and Y-cable	33
3.4.5	Wiring the ECOFAST terminal block	37
3.4.6	Wiring the M12, 7/8" terminal block	41
3.4.7	Looping PROFIBUS DP and the supply voltage.....	45
4	Configuration	47
5	Commissioning	48
5.1	Commissioning ET 200eco	48
6	Alarm, error and system messages	50
6.1	Diagnostics by LED Display.....	50
6.2	ET 200eco diagnostics.....	53
6.2.1	Reading diagnostics data.....	53
6.2.2	Example: Reading slave diagnostics data using SFC 13 "DP NRM_DG"	54
6.2.3	Configuration of ET 200eco slave diagnostics.....	55
6.2.4	Station states 1 to 3	56
6.2.5	Master PROFIBUS address.....	57
6.2.6	Manufacturer ID	58
6.2.7	Device-specific diagnostics.....	59

7	General specifications	60
7.1	Standards and Approvals	60
7.2	EMC compatibility, shipping and storage conditions	61
7.3	Mechanical and climatic environmental conditions.....	63
7.4	Specifications for insulation tests, protection class, degree of protection, and rated voltage	65
8	Technical specifications.....	67
8.1	Overview	67
8.2	ECOFAST terminal block (6ES7194-3AA00-0AA0)	67
8.3	M12, 7/8" terminal block (6ES7194-3AA00-0BA0).....	69
8.4	I/O module 8 DI (6ES7141-3BF00-0XA0)	71
8.5	I/O module 16 DI (6ES7141-3BH00-0XA0)	75
8.6	I/O module 8 DO 2A (6ES7142-3BF00-0XA0)	79
8.7	I/O module 16 DO 0.5A (6ES7142-3BH00-0XA0).....	83
8.8	I/O module 8 DI / 8 DO 2A (6ES7143-3BH00-0XA0)	87
8.9	I/O module 8 DI / 8 DO 1.3A (6ES7143-3BH10-0XA0)	91
A	Appendix.....	95
A.1	Article numbers	95
A.2	Dimensional drawings.....	102
A.3	I/O address space.....	104
	Glossary	110
	Index.....	112

Product overview

1.1 Distributed I/O systems – overview

Field of application

A plant configuration quite often features a process I/O configuration in a central automation system.

The wiring of process I/O components installed at a grated distance away from an automation system may soon become highly complex and susceptible for electromagnetic interference.

Distributed I/O systems are the perfect solution for such configurations.

- The controller CPU is located in a central rack.
- The I/O systems (inputs and outputs) are operated locally in a distributed configuration.
- The high data transmission rates of the high-performance PROFIBUS DP ensures smooth communication between the PLC and its I/O systems.

PROFIBUS DP

PROFIBUS DP is an open bus system, based on IEC 61784-1 with the "DP" transmission protocol (DP stands for distributed peripherals).

Physically, PROFIBUS DP is either an electrical network based on a shielded two-wire line, or an optical network based on a fiber-optic cable.

The "DP" transmission protocol facilitates high-speed cyclic data exchange between the PLC and its distributed I/O systems.

DP masters and DP slaves

The DP master links the controller CPU with the distributed I/O systems. It exchanges data with its distributed I/O systems via PROFIBUS DP, and monitors the PROFIBUS DP.

The distributed I/O systems (= DP slaves) prepare the data of the sensors and actuator for the transfer to the CPU via PROFIBUS DP.

Connectable devices

PROFIBUS DP supports the operation of a wide range of devices in DP master or DP slave mode, provided their properties are compliant with IEC 61784-1. This includes devices of the following product families:

- SIMATIC S5
- SIMATIC S7/M7/C7
- SIMATIC PG/PC
- SIMATIC HMIs (operating and monitoring devices OP, OS, and TD)
- Devices from other manufacturers

Configuration of a PROFIBUS DP network

The figure below illustrates the typical configuration of a PROFIBUS DP network. The DP masters are integrated into the relevant device, for example, the S7-400 or S7-300 PLC is equipped with a PROFIBUS DP interface. The DP slaves formed by the distributed I/O systems are connected to the DP masters via PROFIBUS DP.

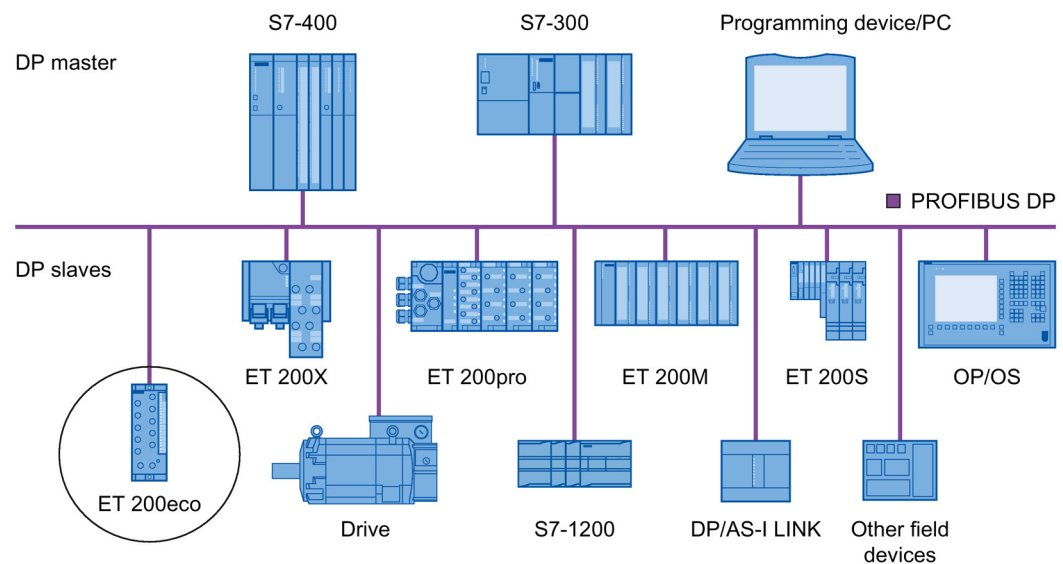


Figure 1-1 Typical configuration of a PROFIBUS DP network

1.2 ET 200eco Distributed I/O Device

Definition

The ET 200eco distributed I/O device is a compact DP slave with degree of protection IP 65, IP 66 or IP 67.

Field of application

The fields of application of the ET 200eco are derived from its special properties.

- A robust design and degree of protection IP65, IP66 or IP67 make the ET 200eco distributed I/O device particularly suitable for use in harsh industrial environments.
- The compact design of ET 200eco is particularly favorable for applications in confined spaces.
- The easy handling of ET 200eco ensures quick commissioning and maintenance.

View

The ET 200eco consists of an I/O module and a terminal block. These are available in various versions.

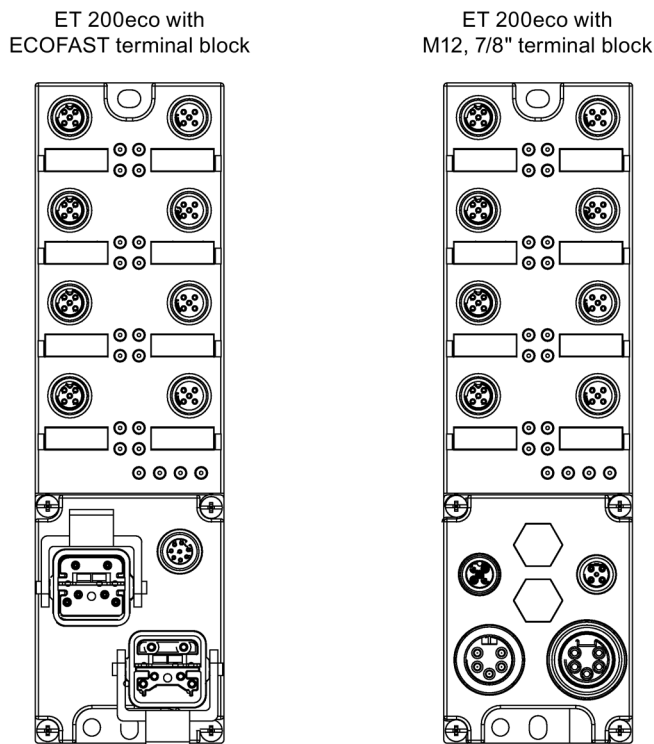

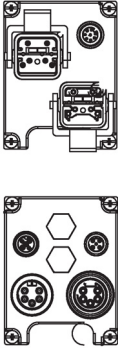


Figure 1-2 View of the ET 200eco Distributed I/O Device

ET 200eco components

The table below provides an overview of the most important components of the ET 200eco distributed I/O system:

Table 1- 1 ET 200eco components

Component	Function	Diagram
I/O module	<p>You connect the sensors and actuators of your system to the I/O module. The I/O module is available in the following versions:</p> <ul style="list-style-type: none"> • 8 DI • 16 DI • 8 DO 2A • 16 DO 0.5A • 8 DI / 8 DO 2A • 8 DI / 8 DO 1.3A 	
Terminal block	<p>You connect the power supply for the ET 200eco and PROFIBUS DP to the terminal block.</p> <p>The terminal block is available in the following versions:</p> <ul style="list-style-type: none"> • ECOFAST • M12, 7/8" 	

DP master

The ET 200eco supports communication with all DP masters that conform to the IEC 61784-1 standard.

Installing

2.1 Mounting position, mounting dimensions

Mounting position

An ET 200eco can be mounted in any position.

Mounting and clearance dimensions

The following table shows the mounting and clearance dimensions.

Table 2- 1 Mounting dimensions

	Dimensions
Mounting width	<ul style="list-style-type: none">• 60 mm
Mounting height	<ul style="list-style-type: none">• 210 mm
Mounting depth	<ul style="list-style-type: none">• with ECOFAST terminal block: 60 mm (without connector)• with terminal block M12, 7/8": 54 mm (without connector)

2.2 Installing the I/O module

Simple installation

The ET 200eco Distributed I/O Device is designed for easy installation.

Properties

- The I/O module should be mounted on a solid surface.
- The I/O module can be prewired (without installed terminal block).

Requirements

The following table shows the screws that are permitted for the installation of the I/O modules:

Table 2- 2 Screw types

Screw type	Description
Cylinder head screw M5 according to ISO 1207/ISO 1580 (DIN 84/DIN 85)	Minimum screw length: 20 mm. You also need a set of DIN 125 washers.
M5 hex socket cylinder head screw according to DIN 912	

Tools required

Medium-sized recessed head screwdriver or 8 mm socket wrench.

Procedure

Screw-mount the I/O module on a plane surface.

Screw the I/O module onto the panel at both mounting fixtures at the front top and bottom. Tightening torque: 3 Nm.

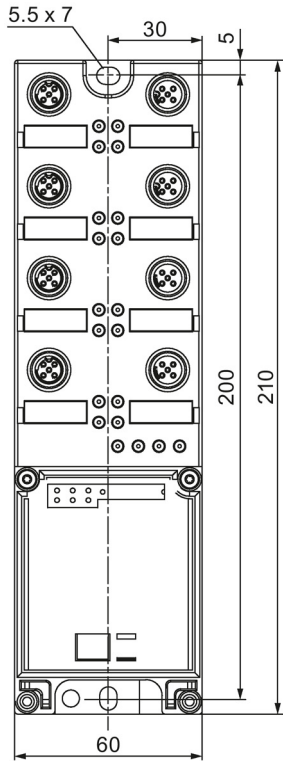


Figure 2-1 Mounting the I/O module onto the panel

2.3 Installing the terminal block

Properties

The terminal block is used to connect the ET 200eco with the PROFIBUS DP and supplies the I/O module with voltage.

Requirements

The I/O module is installed.

Tools required

Recessed head screwdriver, medium size

Installing the terminal block

1. Plug the terminal block into the I/O module.
2. Screw the terminal block onto the I/O module (torque = 1 Nm to 1.3 Nm). Tighten the screws in the terminal block working crosswise.

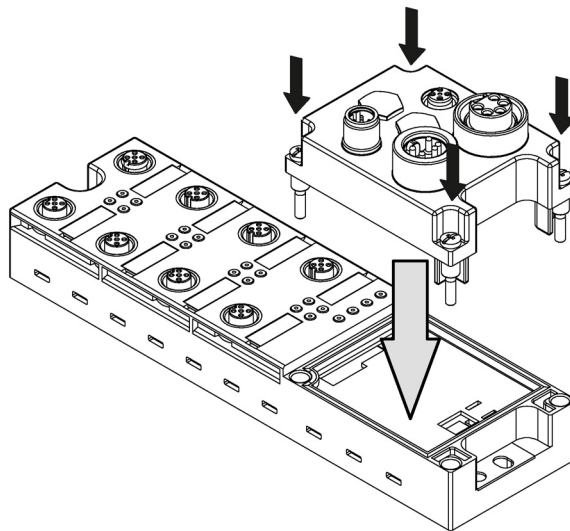


Figure 2-2 Plug the terminal block into the I/O module, then screw-tighten it

Note

The degree of protection IP 65, IP 66 or IP 67 is only ensured if the terminal block is screwed firmly onto the I/O module!

2.4 Replacing labels

Properties

You can label each channel of the I/O module and the terminal block. The labels are already installed in the I/O module in the delivery state:

- 8 labels on the I/O module
- 1 label on the terminal block

Requirements

You can order replacement labels. The article numbers are listed in the Appendix (Page 95).

Tools required

2.5 to 4 mm screwdriver

Replacing labels

1. Push the screwdriver into the small opening of the label at an angle, then lever it out.

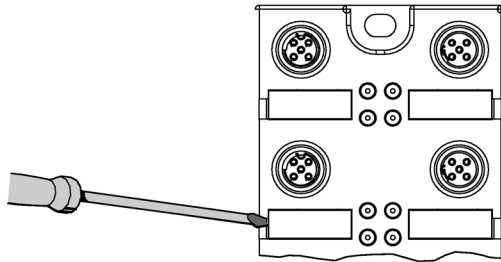


Figure 2-3 Removing labels

2. Push the label into the module using your fingers.

2.5 Removing the ET 200eco

Procedure

The ET 200eco is wired and in operation. To remove the ET 200eco distributed I/O system, follow these steps:

1. Shut off the supply voltage to ET 200eco.
2. Disconnect the wiring from the terminal module.
3. Loosen the four fixing screws on the terminal block.
4. Disconnect the terminal block from the I/O module.
5. Disconnect the wiring from the I/O module.
6. Disconnect the fixing screws from the I/O module.

Note

When replacing the I/O module, refer to the chapter Looping of PROFIBUS DP and supply voltage (Page 45).

2.6 Setting the PROFIBUS address

Properties

The PROFIBUS address specifies the address of the ET 200eco Distributed I/O Device on the PROFIBUS DP.

The PROFIBUS DP address of the ET 200eco is set at the terminal block.

Requirements

- Each address can be assigned only once on PROFIBUS DP.
- The set PROFIBUS address must match the PROFIBUS address set for this ET 200eco in your configuration software.
- A change of the PROFIBUS DP address is only accepted at the ET 200eco after POWER ON.

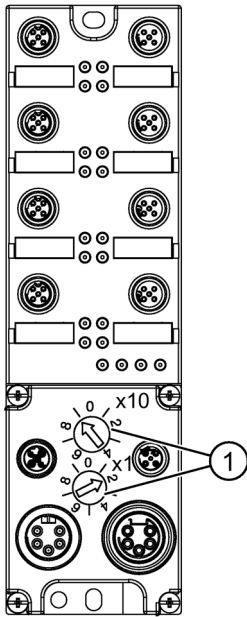
Tools required

- 14 mm socket wrench
- 2.5 mm screwdriver

Setting the PROFIBUS DP address with M12, 7/8" terminal block

Permissible PROFIBUS DP addresses: 1 to 99.

1. Remove the two sealing caps from the rotary switches (use a 14 mm wrench).
2. Set the required PROFIBUS addresses on the rotary switches using a screwdriver.
 - Bottom rotary switch: Units digit
 - Top rotary switch: Tens place
3. Reinstall both caps on the rotary switches (torque: 0.5 Nm to 0.8 Nm).



① Rotary switch for setting the PROFIBUS address

Figure 2-4 Setting the PROFIBUS DP address with M12, 7/8" terminal block

Example of an address setting: PROFIBUS address 92

	Position 9
	Position 2

Setting the PROFIBUS DP address at an ECOFAST terminal block

The permissible range of PROFIBUS DP address is 1 to 99. If you set a higher address, the red bus error LED of the I/O module will indicate a fault.

1. Loosen the screws of the configuration connector with the ECOFAST terminal block and strip it off the connector.

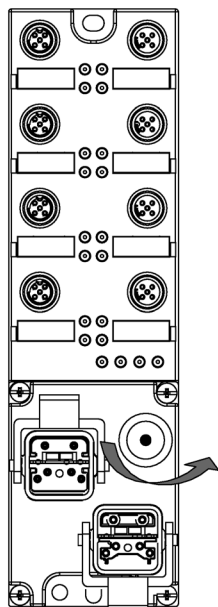


Figure 2-5 Loosen the screws of the configuration connector

2. Remove the cap from the configuration connector.

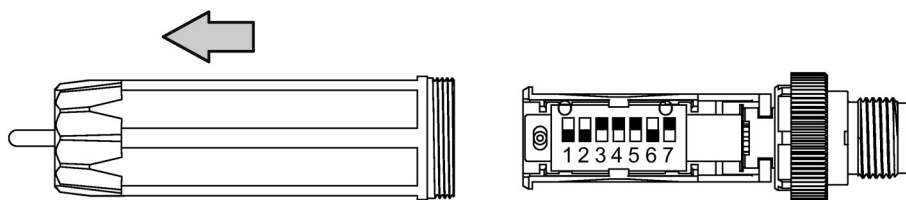


Figure 2-6 Removing the cap

3. Set the PROFIBUS address at the DIL switches.

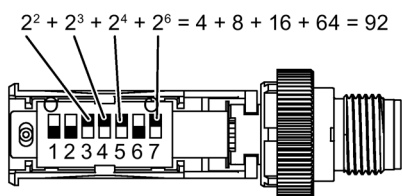


Figure 2-7 Setting the PROFIBUS address at the configuration connector, sample address: 92

4. Screw on the cap again.
5. Place the configuration connector onto the terminal block and then secure it with the screws.

Connecting

3.1 General operating rules and regulations

Introduction

Special rules and regulations have to be followed when operating an ET 200eco Distributed I/O Device as part of a plant or system, depending on the field of application.

This section provides an overview of the most important rules you have to observe when integrating the ET 200eco Distributed I/O Device in a plant or system.

EMERGENCY OFF equipment

EMERGENCY OFF equipment to IEC 204 (corresponds to DIN VDE 113) must remain effective in all operating modes of the plant or system.

Startup of the system after certain events

The table below identifies situations you must pay attention to when the system starts up after the occurrence of certain events.

If ...	then ...
Startup follows a power dip / failure Startup of the ET 200eco follows an interruption of bus communication	Dangerous operating states must be avoided at all times. If necessary, force an "EMERGENCY OFF"!
Startup after releasing the EMERGENCY OFF equipment	Any uncontrolled or undefined startup must be avoided.

24 V DC supply

The table shows what you have to observe for the 24 V DC supply.

At ...	Requirements ...	
Buildings	external lightning protection	take lightning protection measures (for example, lightning protection elements)
24 V DC power supply cables, signal cables	internal lightning protection	
24 V DC supply	safe (electrical) isolation of the extra-low voltage	
Looping the power supply	Voltage drop with looping (see chapter Looping of PROFIBUS DP and supply voltage (Page 45))	

Protection against external electrical interference

The table below shows what to observe in order to protect the system against electrical interference or faults.

At ...	ensure that ...
all plants or systems in which the ET 200eco is integrated	the plant or system is connected to a protective conductor in order to discharge electromagnetic interference to ground.
supply, signal, and bus lines	the wiring arrangement and installation is correct.
signal and bus lines	a wire break or conductor break does not result in undefined states of the plant or system.

3.2 Operating the ET 200eco on grounded mains

Introduction

This section provides information about the overall configuration of an ET 200eco Distributed I/O Device on grounded mains (TN-S network). The specific subjects discussed are: Disconnecting devices, short-circuit protection and overload protection to DIN VDE 0100 and DIN EN 60204-1.

Definition: Grounded mains

The neutral conductor of a TN-S system is always bonded to ground. A simple short-circuit to ground of a live conductor, or of a grounded component of the plant will trip the disconnecting devices.

Components and protective measures

Various components and protective measures are stipulated for plant installation. The nature of the components and of the degree to which protective measures are binding depends on the DIN VDE regulation applicable to your plant configuration. The next table refers to the diagram below.

Table 3- 1 Comparison of the protective measures

Compare ...	Reference to the diagram	DIN VDE 0100	DIN EN 60204
Disconnecting device for controllers, signal sensors and actuators	①	... Part 460: Main switch	... Part 1: Disconnect switch
Short-circuit and overload protection	②	... Part 725: Single-pole protection of circuits	... Part 1: with grounded secondary power circuit: single-pole protection

Safety isolation

Safety isolation is required for:

- Modules which must be supplied with ≤ 60 V DC or ≤ 25 V AC
- 24 V DC load circuits

Installing an ET 200eco with grounded reference potential

In an ET 200eco configuration with grounded reference potential, any interference currents will be discharged to protective earth. The connections must be interconnected either externally or in the connector (see the figure below): Connection between 1M and PE).

Installing an ET 200eco with ungrounded reference potential

In an ET 200eco configuration with ungrounded reference potential, any disturbance will be discharged to protective earth via an internal RC circuit (see the figure below: No connection between 1M and PE).

Isolation monitoring

Isolation monitoring must be provided if:

- The ET 200eco is operated with ungrounded potential
- A repetitive error is liable to cause dangerous plant states

ET 200eco in the overall configuration

The figure below shows the overall configuration of the ET 200eco Distributed I/O Device (load voltage supply and grounding concept) supplied with power from TN-S mains.

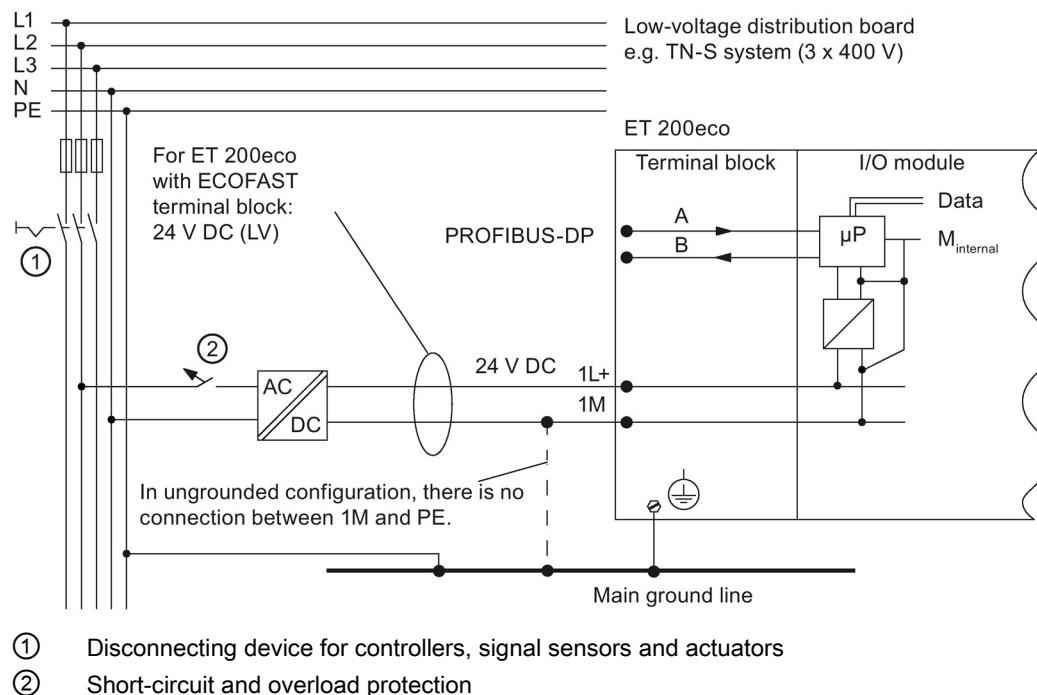


Figure 3-1 Operating the ET 200eco on grounded reference potential

3.3 Electrical configuration of ET 200eco

Electrical isolation

Electrically isolated components in the ET 200eco configuration:

- 1L+ (electronics / sensor supply):
Electrical isolation from PROFIBUS DP and 2L+ (load voltage supply), except at I/O module 8 DI / 8DO 2A.
- 2L+ (load voltage supply):
Electrical isolation from all other circuitry, except for I/O module 8 DI / 8DO 2A. 1M and 2M of I/O module 8 DI / 8DO 2A are internally interconnected.
- PROFIBUS DP interface:
Electrical isolation from all other circuitry.

ET 200eco configuration

The diagrams below show the potentials of an ET 200eco configuration with M12, 7/8" terminal block and with ECOFAST terminal block.

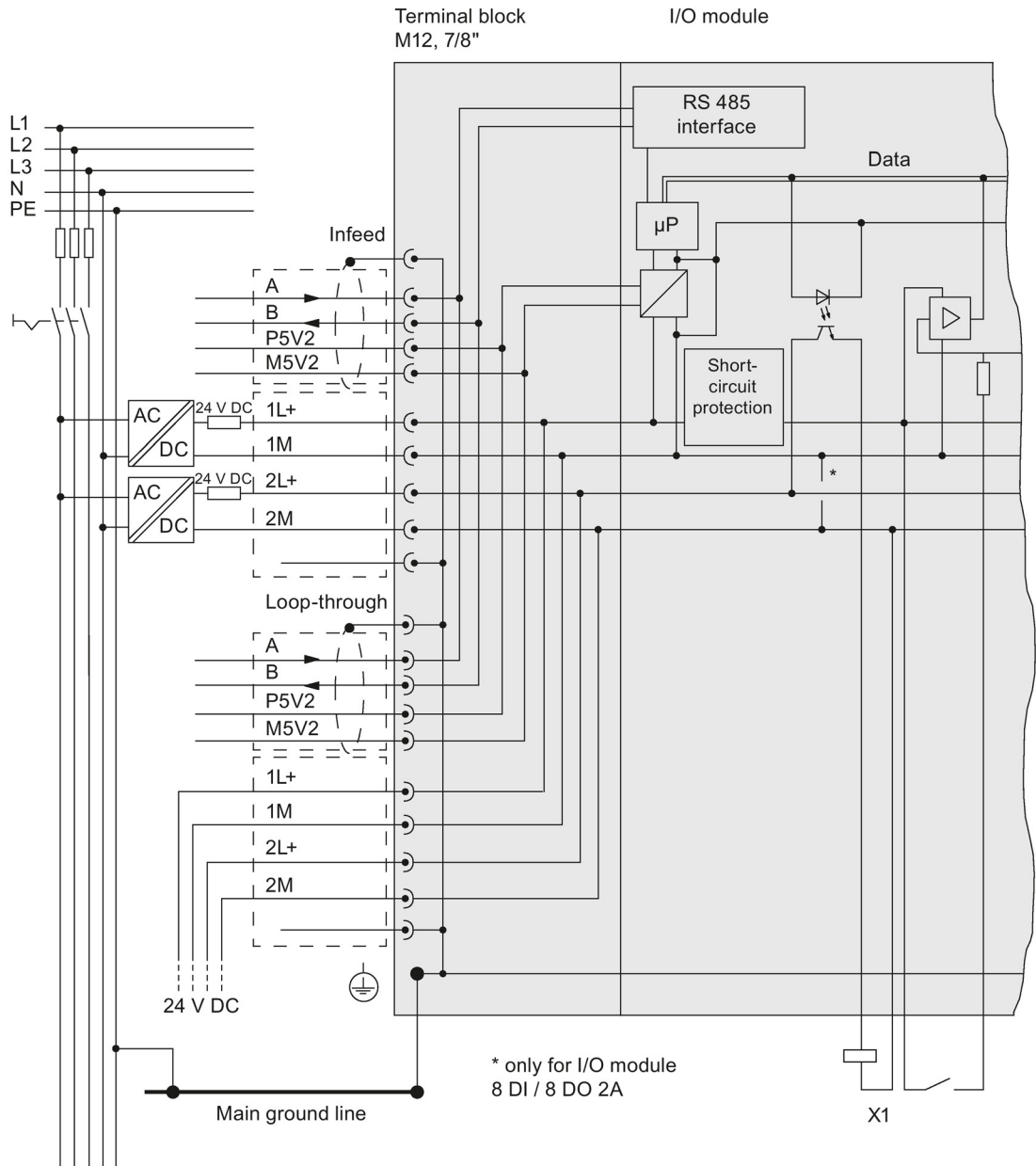


Figure 3-2 Potentials of an ET 200eco configuration with M12, 7/8" terminal block

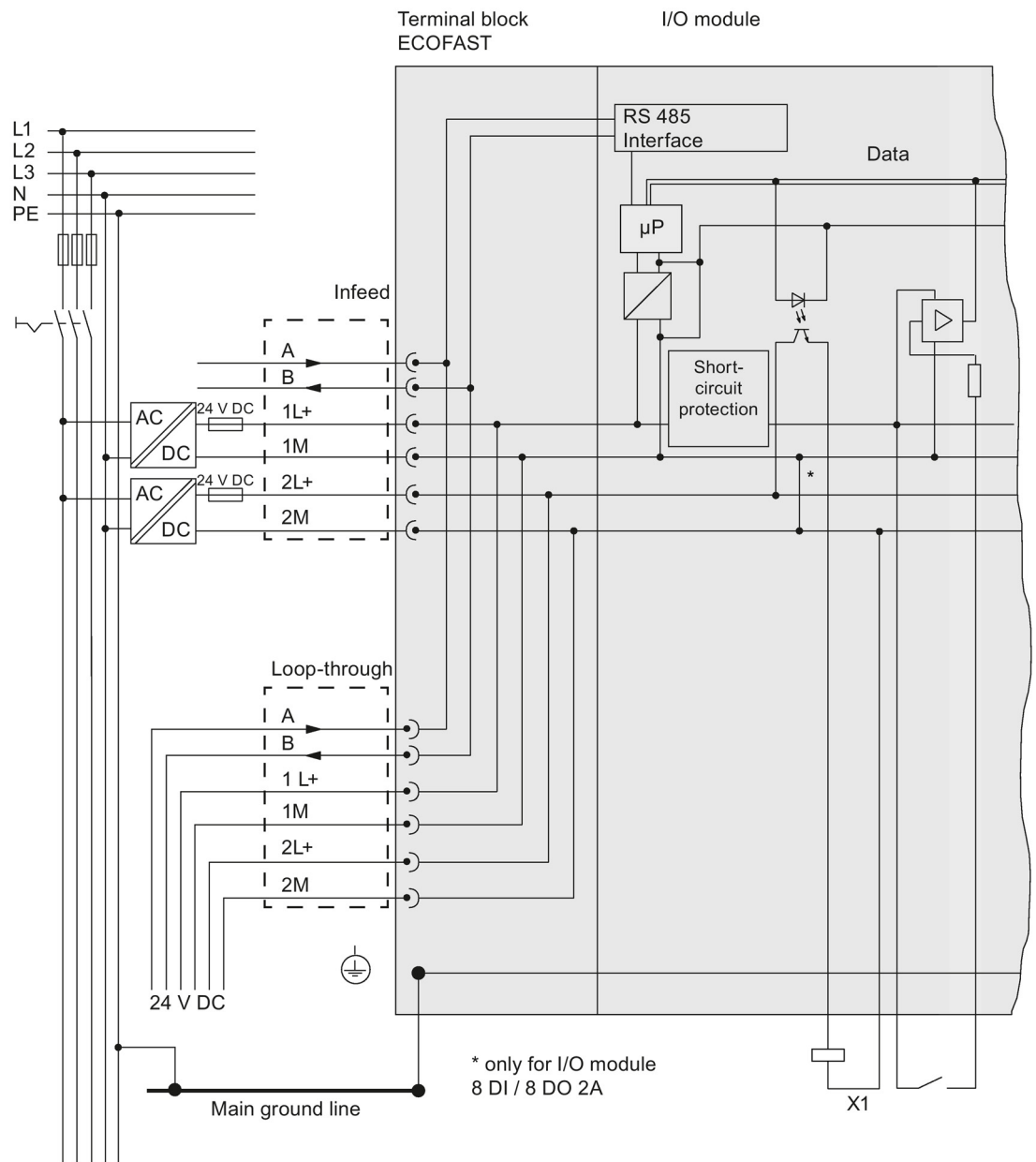


Figure 3-3 Potentials of an ET 200eco configuration with ECOFAST terminal block

Note

* The ground potentials of the 1L+ electronics / sensor supply and 2L+ load voltage supply of the ET 200eco Distributed I/O Device with I/O module 8DI / 8DO 2A are interconnected.

Note

Applicable to ET 200eco with terminal block:

- Sensors are supplied with power from the 1L+ electronics / sensor supply
 - The outputs are supplied with power from the 2L+ load voltage supply.
-

Protective measures against the destruction of components

In order to prevent the destruction of ET 200eco or of any of its components, you should always protect the feed lines of the electronics / sensor supply and of the load voltage supply by means of over-current release:

- Protection of the electronics / sensor/ supply 1L+:
24 V DC / 10 A: tripping characteristics (type) B or C
- Protection of load voltage 2L+:
24 V DC / 16 A: tripping characteristics (type) B or C

3.4 Wiring the ET 200eco

3.4.1 Wiring procedures (steps)

Wiring procedures

You wire an ET 200eco Distributed I/O Device in several steps. To wire the ET 200eco Distributed I/O System, follow these steps:

1. Connect the ET 200eco to protective earth.
2. Wire the I/O module.
3. Wire the terminal block.

3.4.2 Connecting ET 200eco to protective earth (PE)

Properties

- Always connect the ET 200eco to protective earth. The I/O module is equipped with a grounding screw.
- The module also requires this connection to protective earth in order to discharge any interference currents to ground, and for EMC compatibility.

Requirements

Always make sure you have a low-impedance connection to protective earth.

Tools required

- Stripping tool
- Crimp tool
- Screwdriver

Accessories required

- M5 x 10 fixing screw and washers
- Grounding cable (copper braid), conductor cross-section min. 4 mm²
- Cable lugs

Connecting ET 200eco to protective earth

1. Strip the grounding conductor and crimp on the cable lug.
2. Screw the cable lug onto the I/O module (M5 fixing screw).

The torque is 3 Nm.

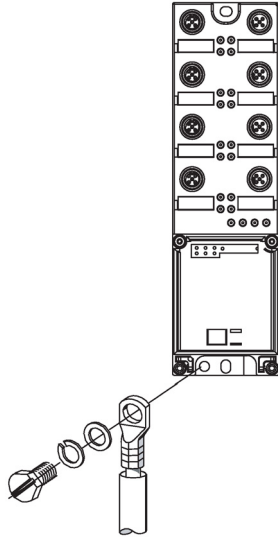


Figure 3-4 Connecting the I/O module to protective earth

3.4.3 Wiring I/O modules with M12 connectors

Properties

- Connect the digital I/O to the 5-pin M12 circular socket connectors on the front panel of the I/O module.
- You may also use 5-pin M12 circular connectors or Y connectors. The article numbers are listed in the Appendix (Page 95).

Requirements

Always wire the I/O module after you switched off the power supply or removed the terminal block.

Tools required

Stripping tool and screwdriver for wiring the M12 circular connector, if you do not use patch cables.

Accessories required

- Pre-assembled cable with 5-pin M12 circular connector or 3, 4 or 5-wire Cu cable, flexible (conductor cross-section must be $\leq 0.75 \text{ mm}^2$), and 5-pin M12 circular connector (see tables below)
- M12 sealing caps
- For article numbers, refer to the Appendix (Page 95)

Connecting the M12 connector

To connect the M12 connector, follow these steps:

1. Plug the connector into the relevant circular socket connector on the I/O block. Make sure the connectors and sockets are properly interlocked (matched joint).
2. Secure the connector by tightening the knurled ring nut.

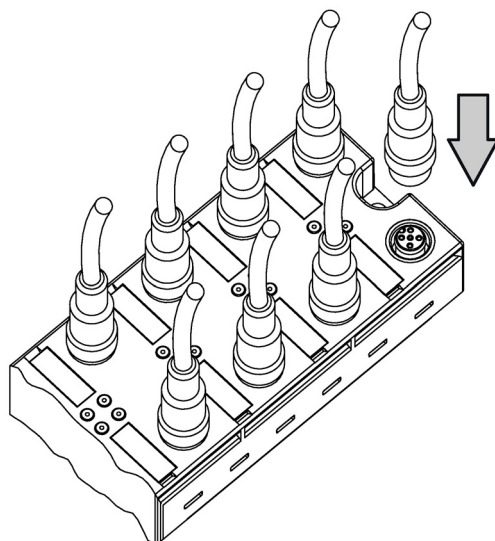


Figure 3-5 Connecting the M12 connector

Terminal assignment of the M12 circular connector on I/O module 8 DI

Table 3-2 M12 circular connector on I/O module 8 DI

Pin	Pin-out X1 to X8	View of the circular connector (wiring side)
1	24 V sensor supply ¹ (1L+)	<p>3, 4 or 5-wire copper cable</p>
2	n.c.	
3	Sensor supply ground (1M)	
4	Input signal	
5	PE	

¹ supplied internally to the connected sensor by ET 200eco

Terminal assignment of the M12 circular connector on I/O module 16 DI

Table 3- 3 M12 circular connector on I/O module 16 DI

Pin	Pin-out X1 to X8	View of the circular connector (wiring side)
1	24 V sensor supply ¹ (1L+)	<p>4-wire or 5-wire copper cable</p>
2	Input signal ² (n + 8)	
3	Sensor supply ground (1M)	
4	Input signal ³ (n)	
5	PE	

¹ supplied internally to the connected sensor by ET 200eco
² In the process image of inputs (PII): Input byte x+1
³ In the process image of inputs (PII): Input byte x

M12 circular connector on I/O module 8 DO 2A

Table 3- 4 M12 circular connector on I/O module 8 DO 2A

Pin	Pin-out X1 to X8	View of the circular connector (wiring side)
1	n.c.	<p>3-wire or 4-wire cable</p>
2	n.c.	
3	Load voltage ground (2M)	
4	Output signal	
5	PE	

Terminal assignment of the M12 circular connector on I/O module 16 DO 0.5A

Table 3- 5 M12 circular connector on I/O module 16 DO 0.5A

Pin	Pin-out X1 to X8	View of the circular connector (wiring side)
1	n.c.	4-wire or 5-wire copper cable
2	Output signal ¹ (n + 8)	
3	Load voltage ground (2M)	
4	Output signal ² (n)	
5	PE	

¹ In the process image of outputs (PIO): Output byte x+1
² In the process image of outputs (PIO): Output byte x

Terminal assignment of the M12 circular connector on I/O module 8 DI / 8 DO 2A

Table 3- 6 M12 circular connector on I/O module 8 DI / 8 DO 2A

Pin	Assignment	View of the circular connector (wiring side)
1	24 V sensor supply ¹ (1L+)	4-wire or 5-wire copper cable
2	Input signal	
3	Sensor / load voltage supply ground ² (1M/2M)	
4	Output signal	
5	PE	

¹ supplied internally to the connected sensor by ET 200eco
² common ground for sensor and load voltage supply (1M and 2M internally interconnected)

Terminal assignment of the M12 circular connector on I/O module 8 DI / 8 DO 1.3A

Table 3- 7 M12 circular connector on I/O module 8 DI / 8 DO 1.3A, pin-out X1, X3, X5, X7

Pin	Pin-out X1, X3, X5, X7	View of the circular connector (wiring side)
1	24 V sensor supply ¹ (1L+)	<p>4-wire or 5-wire copper cable</p>
2	Input signal ² (n + 1)	
3	Sensor supply ground (1M)	
4	Input signal ² (n)	
5	PE	
¹ supplied internally to the connected sensor by ET 200eco ² In the process image of inputs (PII): Input byte x		

Table 3- 8 M12 circular connector on I/O module 8 DI / 8 DO 1.3A, pin-out X2, X4, X6, X8

Pin	Pin-out X2, X4, X6, X8	View of the circular connector (wiring side)
1	n.c.	<p>4-wire or 5-wire copper cable</p>
2	Output signal ¹ (n + 1)	
3	Load voltage ground (2M)	
4	Output signal ¹ (n)	
5	PE	
¹ In the process image of outputs (PIO): Output byte x		

Closing unused circular socket connectors

Close all unused circular socket connectors using M12 caps to achieve the degree of protection IP 65, IP 66 or IP 67. The article numbers are listed in the Appendix (Page 95).

Reference

For more information on the input/output byte see the Appendix (Page 104).

3.4.4 Wiring I/O modules with Y-connector and Y-cable

Introduction

Alternatively, you can replace the M12 connector with a Y-connector or Y-cable.

The Y-connector or Y-cable allows you to connect two actuators or sensors to the ET 200eco inputs or outputs.

The use of a Y-connector or Y-cable is particularly recommended when each socket of the module is occupied by two channels:

- I/O module 16 DI
- I/O module 16 DO 0.5A
- I/O module 8 DI / 8 DO 2A
- I/O module 8 DI / 8 DO 1.3A

The Y-connector or Y-cable distributes the two channels to 2 circular connectors (the tables below show the terminal assignments).

Note

The Y-connector cannot be used in combination with the M12, 5-pin angular connector, order no. 3RX1668.

Connecting Y-connector or Y-cable

1. Plug the Y-connector or Y-cable into the relevant circular socket connector on the I/O module. Make sure the connectors and sockets are properly interlocked (matched joint).
2. Secure the connector by tightening the knurled ring nut.

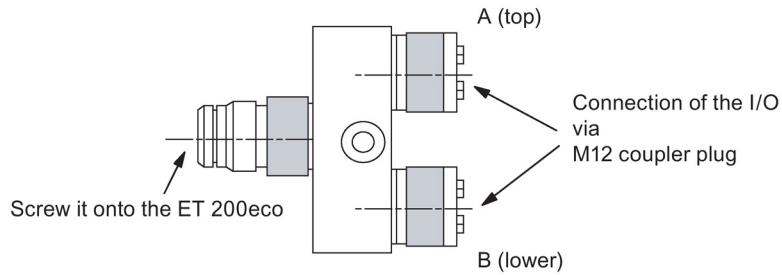


Figure 3-6 Y-connector

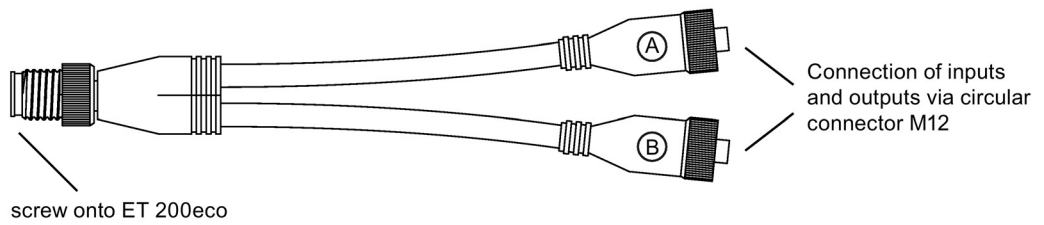


Figure 3-7 Y-cable

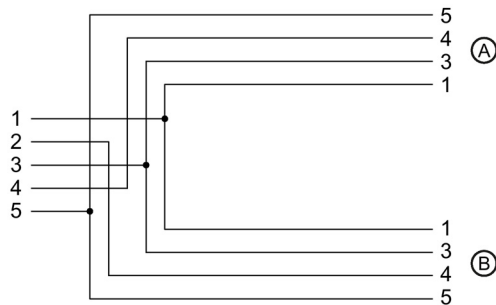


Figure 3-8 Wiring the Y-cable

Terminal assignment of the Y-connector or Y-cable on I/O module 16 DI

Table 3- 9 Y-connector or Y-cable on I/O module 16 DI

Pin	Pin-out circular connectors X1 to X8		View Y-connector or Y-cable
	A (top)	B (bottom)	
1	24 V sensor supply ¹ (1L+)		
2	n.c.		
3	Sensor supply ground (1M)		
4	Input signal from pin 4 ²	Input signal from pin 2 ²	
5	PE		

¹ supplied internally to the connected sensor by ET 200eco
² specified pins refer to the connection socket on the I/O module

Terminal assignment of the Y-connector or Y-cable on I/O module 16 DO 0.5A

Table 3- 10 Y-connector or Y-cable on I/O module 16 DO 0.5A

Pin	Pin-out circular connectors X1 to X8		View Y-connector or Y-cable
	A (top)	B (bottom)	
1	n.c.		
2	n.c.		
3	Load voltage ground (2M)		
4	Output signal from pin 4 ¹	Output signal from pin 2 ¹	
5	PE		

¹ specified pins refer to the connection socket on the I/O module

Terminal assignment of the Y-connector or Y-cable on I/O module 8 DI / 8 DO 2A

Table 3- 11 Y-connector or Y-cable on I/O module 8 DI / 8 DO 2A

Pin	Pin-out circular connectors X1 to X8		View Y-connector or Y-cable
	A (top)	B (bottom)	
1	24 V sensor supply ¹ (1L+)		
2	n.c.		
3	Sensor / load voltage supply ground ² (1M/2M)		
4	Output signal at pin 4 ³	Input signal at pin 2 ³	
5	PE		

¹ supplied internally to the connected sensor by ET 200eco
² common ground for sensor supply and load voltage supply (1M and 2M internally interconnected)
³ specified pins refer to the connection socket on the I/O module

Terminal assignment of the Y-connector or Y-cable on I/O module 8 DI / 8 DO 1.3A

Table 3- 12 Y-connector or Y-cable on I/O module 8 DI / 8 DO 1.3A, pin-out X1, X3, X5, X7

Pin	Pin-out circular connectors X1, X3, X5, X7		View Y-connector or Y-cable
	A (top)	B (bottom)	
1	24 V sensor supply ¹ (1L+)		
2	n.c.		
3	Sensor supply ground (1M)		
4	Input signal from pin 4 ²	Input signal from pin 2 ²	
5	PE		

¹ supplied internally to the connected sensor by ET 200eco
² specified pins refer to the connection socket on the I/O module

Table 3- 13 Y-connector or Y-cable on I/O module 8 DI / 8 DO 1.3A, pin-out X2, X4, X6, X8

Pin	Pin-out circular connectors X2, X4, X6, X8		View Y-connector or Y-cable
	A (top)	B (bottom)	
1	n.c.		
2	n.c.		
3	Load voltage ground (2M)		
4	Output signal from pin 4 ¹	Output signal from pin 2 ¹	
5	PE		

¹ specified pins refer to the connection socket on the I/O module

See also

Article numbers (Page 95)

3.4.5 Wiring the ECOFAST terminal block

Properties

- You connect the power supplies and PROFIBUS DP to the ECOFAST terminal block using an ECOFAST connector.
- An additional ECOFAST connector can be used to loop the power supplies and PROFIBUS DP.
- Terminate the first and last ET 200eco (node) on PROFIBUS DP with a terminating resistor.

Requirements

The PROFIBUS address is set according to your configuration.

Tools required

Screwdriver, stripping tool and crimp tool for wiring the ECOFAST connector, if you do not use a ready-to-use ECOFAST connector.

Accessories required

- ECOFAST hybrid patch cable with ECOFAST connector. The cable is available in various lengths.
- If you do not use the ECOFAST hybrid patch cable (see the table below):
 - Han Brid Cu cable connector or Han Brid Cu cable plug
 - ECOFAST hybrid cable
- PROFIBUS DP terminating resistor (ECOFAST)
- For article numbers, refer to the Appendix (Page 95)

Wiring ECOFAST connectors

The table below shows the terminal assignment of the ECOFAST connector

Table 3- 14 Terminal assignment of the ECOFAST connector

Pin	Assignment	View of the ECOFAST connector
Infeed X01		<p>The diagram illustrates the terminal assignments for two connector types: X01 (Infeed) and X02 (Loop-through). Both diagrams show a 4-pin connector with terminals labeled A, B, 1, 2, 3, and 4. Terminal A is connected to Signal A, and terminal B is connected to Signal B. Terminal 1 is connected to 1L+ (electronics/sensor supply), and terminal 2 is connected to 2L+ (electronics/sensor supply ground). Terminal 3 is connected to 1L+ (load voltage ground), and terminal 4 is connected to 2L+ (load voltage supply). The diagrams also show the connection of the ECOFAST hybrid cable and the 1L+ and 2L+ power lines.</p>
A	PROFIBUS DP signal A	
B	PROFIBUS DP signal B	
1	1L+ electronics / sensor supply	
2	Electronics/sensor supply ground (1M)	
3	Load voltage ground (2M)	
4	2L+ load voltage supply	
Loop-through X02		
A	PROFIBUS DP signal A	
B	PROFIBUS DP signal B	
1	1L+ electronics / sensor supply	
2	Electronics/sensor supply ground (1M)	
3	Load voltage ground (2M)	
4	2L+ load voltage supply	
* Installation instructions are included in the packaging of the Han Brid Cu cable connector or cable plug.		

Connecting the ECOFAST connectors

1. At the terminal block, push the ECOFAST connector interlock downward.
2. Plug the ECOFAST connectors (for 1L+, 2L+ and PROFIBUS DP) into the sockets of the terminal block. Observe the mechanical coding of the connectors for the power supply and the loop through.
3. Push the ECOFAST connector interlock upward.

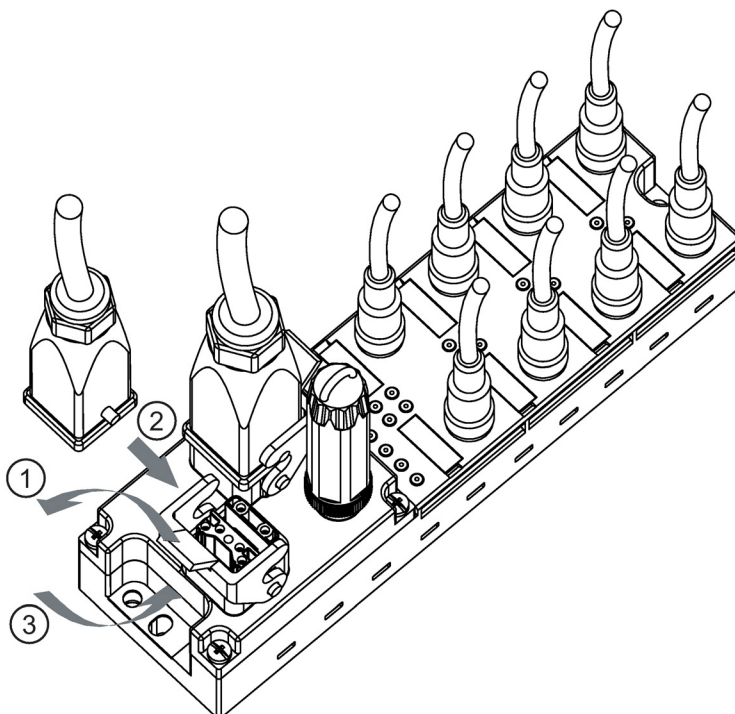


Figure 3-9 Connecting the ECOFAST connectors

CAUTION

Removing ECOFAST connector

It is not permitted to remove the ECOFAST connector while ET 200eco is in operation!
Always switch off the load voltage supply 2L+ before you remove the ECOFAST connector.

Connecting the PROFIBUS DP terminating resistor

Each PROFIBUS DP segment must be terminated at both ends with a wave impedance, i.e. at the first and last node of the segment.

At the last bus node, connect the terminating resistor to the right hand connector of the relevant ECOFAST connection module. The procedure is the same as for the connection of the ECOFAST connector.

The article numbers are listed in the Appendix (Page 95).

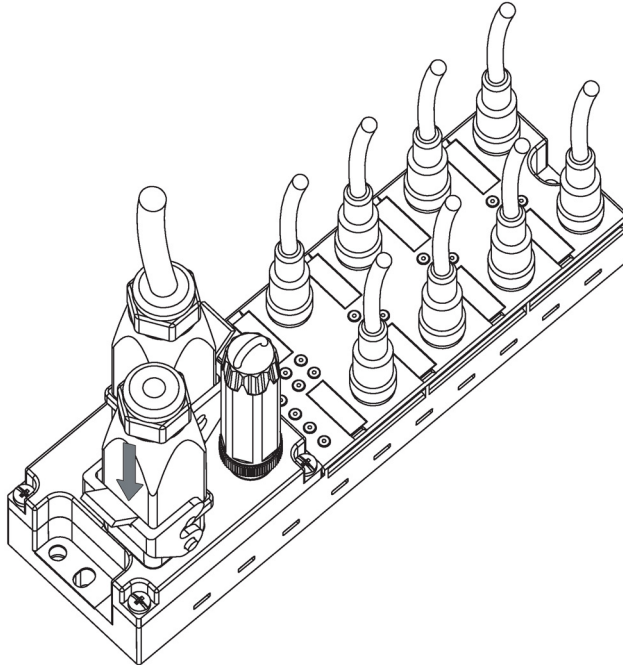


Figure 3-10 Connecting the ECOFAST terminating resistor

Note

The terminating resistor is supplied with power by the electronics / sensor supply 1L+.

Proper functioning of the terminating resistor can only be ensured if the electronics / sensor supply 1L+ does not exceed a tolerance of $\pm 10\%$.

Closing unused sockets

Close all unused ECOFAST sockets using caps to achieve the degree of protection IP 65, IP 66 or IP 67. The article numbers are listed in the Appendix (Page 95).

3.4.6 Wiring the M12, 7/8" terminal block

Properties

- Connect the power supplies and PROFIBUS DP to the M12, 7/8" terminal block.
 - M12 connection: PROFIBUS DP
 - 7/8" connection: Supply voltages
- You can use M12 or 7/8" circular socket connectors to loop the supply voltages and PROFIBUS DP.
- Terminate the first and last ET 200eco (node) on PROFIBUS DP with a terminating resistor.

Requirements

- Always switch off the power supply before you wire the M12, 7/8" terminal block.
- The PROFIBUS address is set according to your configuration, and the terminating resistor is switched on as required.

Tools required

Stripping tool and screwdriver for wiring the M12 or 7/8" connector if you are not going to use ready-to-use connectors.

Accessories required

- Patch cables with connector
- If you are not going to use ready-to-use connectors:
 - M12: 2-wire cable, shielded (bus cable) and M12 connector (see the table below)
 - 7/8": 5-wire cable and 7/8" connector (see the table below)
- M12 terminating resistor for PROFIBUS DP
- For article numbers, refer to the Appendix (Page 95)

Terminal assignment of the M12, 7/8" connector

The tables below show the terminal assignment of the M12, 7/8" connector.

Table 3- 15 M12 connector (PROFIBUS DP)

Pin	Assignment	View of the M12 connector (wiring side)
1	Supply + ¹ (P5V2)	
2	Data channel A (RxD/TxD-N)	
3	Data reference potential ¹ (M5V2)	
4	Data channel B (RxD/TxD-P)	
5	Shielding	
Thread	Shielding	

¹ Can only be used for the M12 terminating resistor. It is not permitted to loop-through the voltage to the next connector using a 5-wire cable.

Table 3- 16 7/8" connector (supply voltages)

Pin	Assignment	View of the 7/8" connector (wiring side)
1	Load voltage ground (2M)	
2	Electronics/sensor supply ground (1M)	
3	PE	
4	1L+ electronics / sensor supply	
5	2L+ load voltage supply	

Note

To connect the supply voltage, we recommend the use of the cables specified in the Appendix (Page 95) (cable 5x1.5 mm² with 7/8" connectors).

If you want to prepare the cable yourself, you should use a cable with a conductor cross-section of 1.5 mm².

Connecting M12, 7/8" connectors

1. Plug the connector (M12 or 7/8") into the relevant circular socket connector on the terminal block. Make sure the connectors and sockets are properly interlocked (matched joint).
2. Secure the connector by tightening the knurled ring nut.

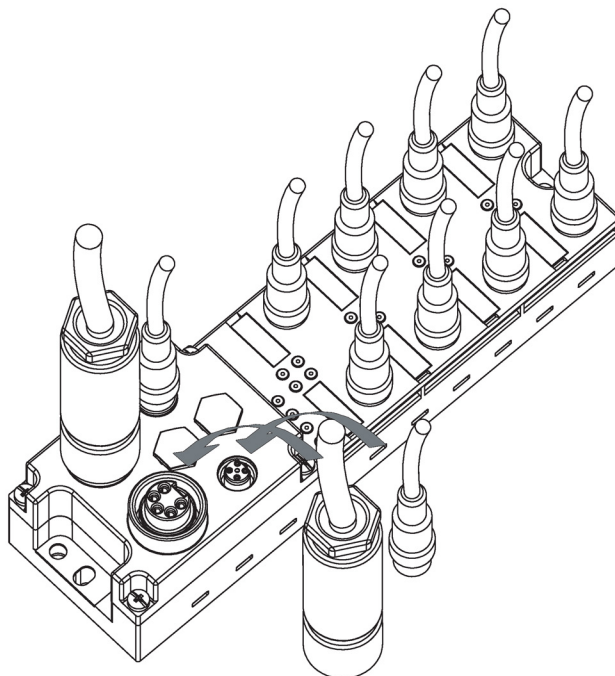


Figure 3-11 Connecting M12, 7/8" connectors

NOTICE**Removing the 7/8" connector**

It is not permitted to remove the 7/8" connector while ET 200eco is in operation! Always switch off the load voltage supply 2L+ before you remove the 7/8" connector.

Connecting the M12 terminating resistor for PROFIBUS DP

Each PROFIBUS DP segment must be terminated at both ends with a wave impedance, i.e. at the first and last node of the segment.

If the ET 200eco is the last PROFIBUS node, terminate PROFIBUS DP using the M12 terminating resistor. The article numbers are listed in the Appendix (Page 95).

1. Plug the M12 terminating resistor into the right M12 circular socket connector loop-through on the terminal block. Make sure the interlock has properly engaged.
2. Secure the M12 connector by tightening the knurled ring nut.

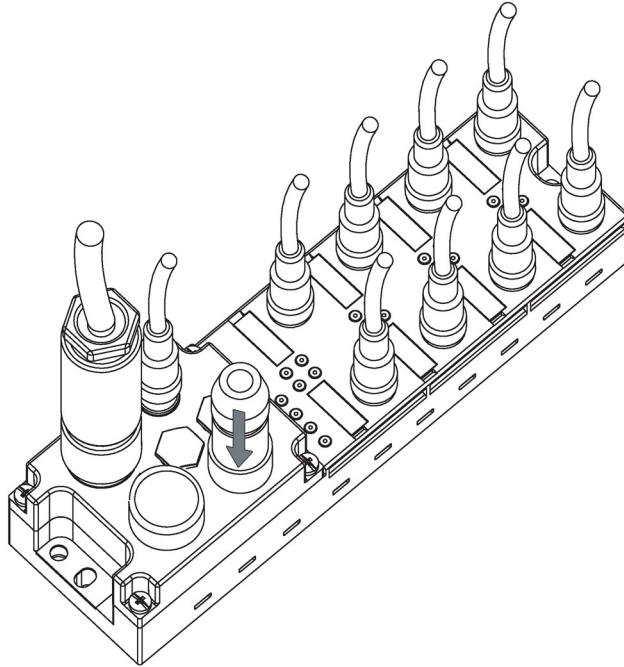


Figure 3-12 Connecting the M12 terminating resistor

Closing unused sockets

Always close all unused sockets using M12 or 7/8" caps to achieve degree of protection IP65, IP66 or IP67. The article numbers are listed in the Appendix (Page 95).

3.4.7 Looping PROFIBUS DP and the supply voltage

Properties

The terminal block is equipped with connectors for the power supplies, and with a socket for looping the supply voltage and PROFIBUS DP. The feed connector and the loop socket are interconnected internally.

Result: The removal of a terminal block while the system is in operation does not influence any downstream PROFIBUS nodes.

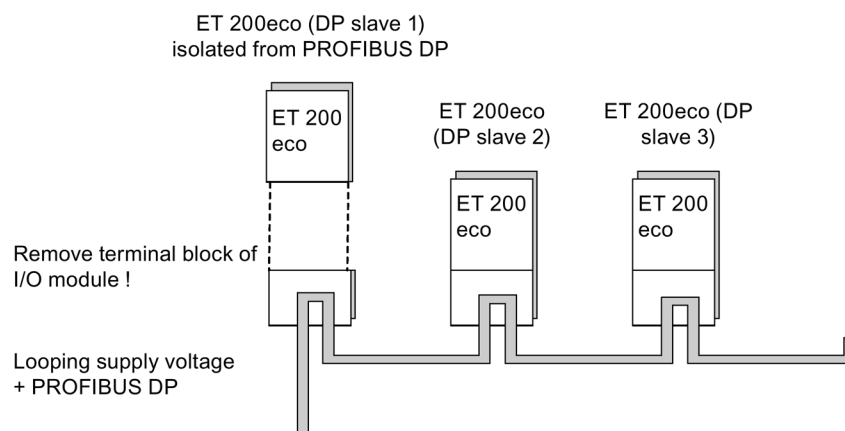


Figure 3-13 Looping PROFIBUS DP and the supply voltage

NOTICE

Removing the terminal block

While ET 200eco is in operation, you may only remove the terminal block if all the outputs are disconnected from the supply. Always switch off the load voltage supply 2L+ before you remove the terminal block. Degree of protection IP 65, IP 66 or IP 67 is no longer guaranteed after removal of the terminal block.

Information on wiring


- Always make allowances for the influence of the cable length on the supply voltage at your ET 200eco (permitted tolerance) when you wire your configuration.

Example with ECOFAST terminal block:

When using a 10m cable with \varnothing 1.5 mm², the voltage will drop by 2.5 V at a load of 10 A; this is equivalent to 0.25 V at a load of 1 A.

- The maximum feed current
 - of the ECOFAST terminal block: 8 A with 1L+ and 10 A with 2L+
 - at the M12, 7/8" terminal block: 6 A with 1L+ and 8 A with 2L+

Those values may not be exceeded.

 CAUTION
Maximum feed currents If you do not maintain the maximum feed current and the appropriate cable cross-sections, you will risk overheating of the cable insulation and contacts, and damage to the device.

Configuration

GSD file

You configure the ET 200eco Distributed I/O Device using the GSD file. The GSD file is used to integrate the ET 200eco into your system as a standard slave. You can download the GSD file on the Internet, at:

- http://www.ad.siemens.com/csi_e/gsd

The GSD files for ET 200eco:

- I/O module 8 DI: Siem80db.gs*
- I/O module 16 DI: Siem80da.gs*
- I/O module 8 DO 2A: Siem80dd.gs*
- I/O module 16 DO 0.5A: Siem80fb.gs*
- I/O module 8 DI / 8 DO 2A: Siem80dc.gs*
- I/O module 8 DI / 8 DO 1.3A: Siem80fc.gs*

The "*" character represents a wildcard for the relevant language (German, for example: Siem80db.gsg)

Integrating the GSD file in your configuration software

The procedures depend on whether you integrate the GSD file into a SIMATIC S7 system (with different configuration software: See the corresponding documentation).

To integrate the GSD file in your configuration software using STEP 7 V4.02 or higher:

1. Run STEP 7, then select "Options > Install New GSD File" in HW Config.
2. On the next dialog box, select the GSD file to install, and confirm with "OK".

Result: The field device appears in the hardware catalog of the PROFIBUS DP folder.

3. Configure the ET 200eco using STEP 7 (refer to the STEP 7 online help).

To integrate the GSD file in your configuration software using COM PROFIBUS V3.0 or higher:

1. Copy the GSD file for ET 200eco to the COM PROFIBUS folder: ...COMPB3\GSD (default).
2. Copy the bitmap file to: ...COMPB3\BITMAPS.
3. Run COM PROFIBUS, then select "File > Load GSD File."

Result: ET 200eco appears in the hardware catalog at the slave configuration.

4. Configure the ET 200eco using COM PROFIBUS (refer to the STEP 7 online help).

Commissioning

5.1 Commissioning ET 200eco

Software requirements

Table 5- 1 Software requirements for commissioning

Configuration software used	Version	Explanations
STEP 7	V4.02 or higher	You have integrated the GSD file for ET 200eco in STEP 7.
	V5.1 or higher + Service Pack 4	The GSD file is supplied with the module.
Configuration software for the DP master used		You need the GSD file of ET 200eco.

Commissioning requirements

Check whether the following requirements for commissioning the ET 200eco distributed I/O system are met:

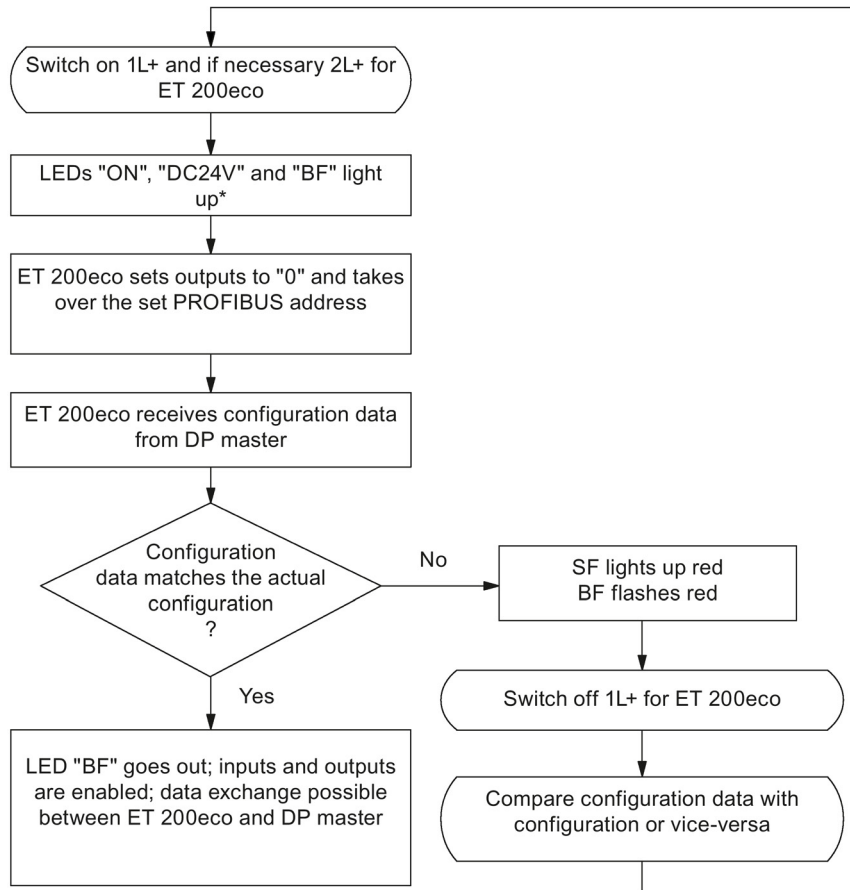
- the DP slave is installed
- the PROFIBUS address is set at the DP slave
- the DP slave is wired
- the DP slave is configured
- supply voltage for DP master is switched on (refer to DP master manual)
- DP master is in RUN mode (refer to DP master manual)

Commissioning ET 200eco

Steps in commissioning the DP slave

1. Switch on the electronics / sensor supply to the DP slave.
2. Switch on the load voltage supply as required.

Startup of ET 200eco



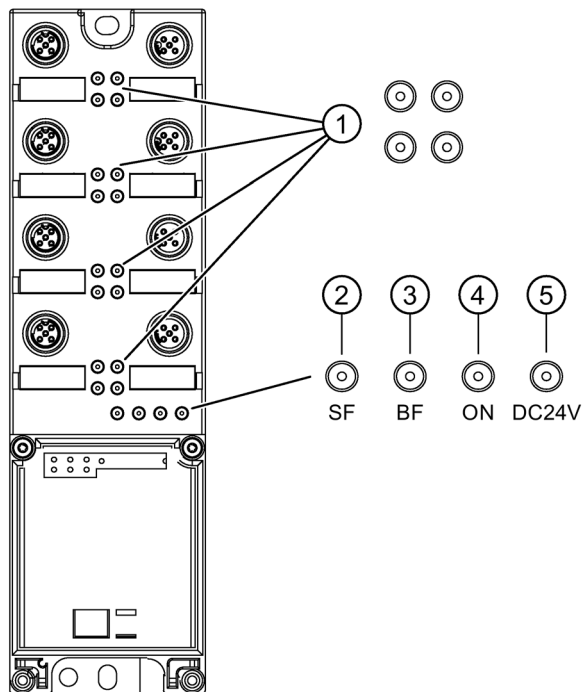
* LED "DC24V" not available with I/O module 8 DI, 16 DI

Figure 5-1 Startup of ET 200eco

Alarm, error and system messages

6.1 Diagnostics by LED Display

I/O module



- ① Status display per channel (green)
- ② Group error (red)
- ③ Bus fault (red)
- ④ Electronic/sensor power supply 1L+ (green)
- ⑤ Load voltage supply 2L+ (green) (I/O module 8 DI, 16 DI not equipped with this LED)

Figure 6-1 LED display on ET 200eco

Status and error displays SF, BF, ON

Table 6- 1 Status and error display by LEDs

LEDs			Meaning	Remedy
SF	BF	ON		
off	off	off	<ul style="list-style-type: none"> Electronics / sensor supply voltage too low or missing at all at the DP slave. Hardware fault. 	<ul style="list-style-type: none"> Switch on the electronics / sensor supply (1L+) for the DP slave. Replace the I/O module.
*	*	on	<ul style="list-style-type: none"> Voltage (electronics / sensor supply) present at the DP slave. 	–
*	on	on	<ul style="list-style-type: none"> DP slave is in STARTUP. 	–
			<ul style="list-style-type: none"> Communication to the DP master is down. The DP slave is unable to detect any transmission rate. 	<ul style="list-style-type: none"> Check the PROFIBUS DP connection. Check the DP master.
			<ul style="list-style-type: none"> Bus interruption DP master is out of service 	<ul style="list-style-type: none"> Check all cables of your PROFIBUS DP network. Verify the firm seating of the PROFIBUS DP on the terminal block.
off	on	on	<ul style="list-style-type: none"> The PROFIBUS address set at the configuration connector is wrong or > 99. 	<ul style="list-style-type: none"> Select a PROFIBUS address from the range 1 to 991
on	off	on	<ul style="list-style-type: none"> Received diagnostics message Hardware fault in DP slave 	<ul style="list-style-type: none"> Evaluate diagnostics data
off	on	on	<ul style="list-style-type: none"> The configuration data sent by the DP master to the DP slave do not match the configuration of the DP slave. 	<ul style="list-style-type: none"> Check the DP slave configuration (I/O address, PROFIBUS address).
off	on	on	<ul style="list-style-type: none"> The DP slave has detected the transmission rate, but is not addressed by the DP master. The DP slave is not configured. 	<ul style="list-style-type: none"> Check the PROFIBUS address at the DP slave or in the configuration software. Check the DP slave configuration (station type).
off	flashes	off	<ul style="list-style-type: none"> Overload at the ET 200eco sensor supply. 	<ul style="list-style-type: none"> Check the sensors / actuators connected to the module. Remove the sensors / actuators one after the other. Result: The BF LED stops flashing, and the ON LED will be lit after you have removed the field device causing the overload. Your hardware is faulty if the BF LED continues flashing even though you have removed all sensors / actuators from the I/O module.

* Not relevant

¹ Switch POWER OFF / POWER ON after you edited the PROFIBUS address. With POWER ON, the PROFIBUS address is applied.

24 V DC status indicator

The 24 V DC LED is lit in green color to indicate the presence of the 2L+ load voltage supply. Only the I/O modules 8 DO 2A, 8 DI / 8 DO 2A, 8 DI / 8 DO 1.3A and 16 DO 0.5A are equipped with this LED.

Channel status display

ET 200eco indicates the status at each input / output on separate LEDs. The LED is lit in green color to indicate the active input / output.

- I/O module 8 DI: 8 input status LEDs
- I/O module 16 DI: 16 input status LEDs
- I/O module 8 DO 2A: 8 output status LEDs
- I/O module 16 DO 0.5A: 16 output status LEDs
- I/O module 8 DI / 8 DO 2A and 8 DI / 8 DO 1.3A: 8 input status LEDs, and 8 output status LEDs

6.2 ET 200eco diagnostics

Note

Disabling diagnostics

Use the following hexadecimal parameter assignment to disable the diagnostics for ET 200eco: 08 00 00 00 00

6.2.1 Reading diagnostics data

Slave diagnostics

The slave diagnostics function is compliant with IEC 61784-1. Depending on the DP master, the diagnostics data of all DP slaves which conform to this standard can be read out using STEP 7.

Options of reading diagnostics data

Table 6- 2 Reading ET 200eco diagnostics data in STEP 7

Automation system with DP master	Block or tab in STEP 7	Application	See ...
SIMATIC S7/M7	"DP Slave Diagnostics" tab	Display slave diagnostics data in plain text on STEP 7 user interface	"Hardware diagnostics" in STEP 7 online help
	SFC 13 "DP NRM_DG"	Reading slave diagnostics data (saving these to the data area of the user program)	Configuration see chapter Example: Reading slave diagnostics data using SFC 13 "DP NRM_DG" (Page 54), SFC see reference manual system and standard functions
	FB 125/FC 125	Evaluating slave diagnostics data	Download of FB/FC 125 from the Internet (http://support.automation.siemens.com/CN/view/en/26996747)
SIMATIC S5 with the S5-95U as DP master	FB 230 "S_DIAG"	Reading slave diagnostics data (saving these to the data area of the user program)	Configuration see the chapter in this manual
			Download of FB 192 from the Internet (http://support.automation.siemens.com/WW/view/en/113141)

6.2.2 Example: Reading slave diagnostics data using SFC 13 "DP NRM_DG"

Application example

Here is an example of how to use SFC 13 to read DP slave diagnostics data in the STEP 7 user program.

Assumptions

For this STEP 7 user program it is assumed that:

- ET 200eco diagnostic address 1022 (3FE_H).
- Slave diagnostics data should be saved to DB 82: starting at address 0.0, length 13 bytes.
- Slave diagnostics data consist of 13 bytes.

STEP 7 user program

STL	Description
CALL SFC 13	
REQ:=TRUE	Read request
LADDR:=W#16#3FE	ET 200eco diagnostics address
RET_VAL:=MW 0	RET_VAL of SFC 13
RECORD:=P#DB82.DBX 0.0 BYTE 13	Diagnostics data mailbox in DB 82
BUSY:=M2.0	Read operation covers several OB1 cycles

6.2.3 Configuration of ET 200eco slave diagnostics

Configuration of ET 200eco slave diagnostics

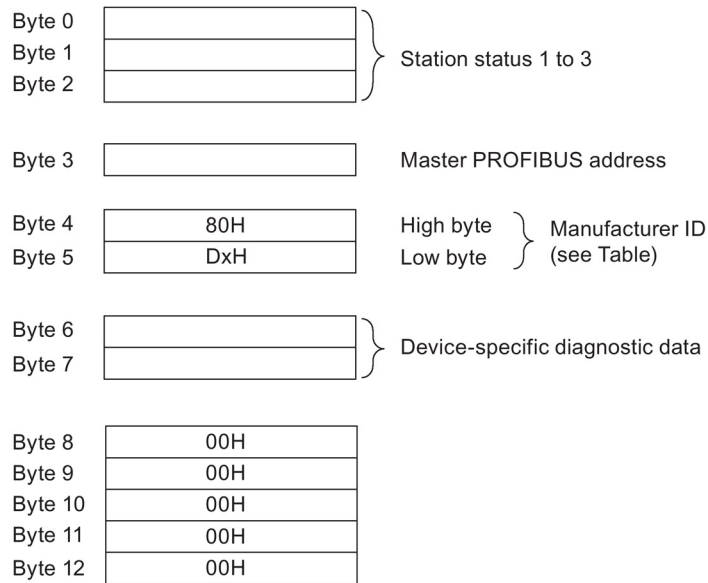


Figure 6-2 Configuration of ET 200eco slave diagnostics

6.2.4 Station states 1 to 3

Definition

Station states 1 to 3 provide an overview of the status of a DP slave.

Station status 1

Table 6-3 Configuration of ET 200eco station status 1 (byte 0)

Bit	Meaning	Cause / remedy
0	1: The DP master cannot address the DP slave. The bit is always 0 at the DP slave.	<ul style="list-style-type: none"> • Check the correct setting of the PROFIBUS address at the DP slave • Check the bus connectors • Check the power supply of the DP slave • Verify the RS 485 Repeater settings • Check whether the DP slave was reset (POWER OFF / POWER ON)
1	1: The DP slave is not yet ready to exchange data.	<ul style="list-style-type: none"> • Wait for the DP slave to complete its startup.
2	1: The configuration data sent by the DP master to the DP slave do not match the configuration of the DP slave.	<ul style="list-style-type: none"> • Verify the station type or DP slave configuration in the configuration software
3	0: The bit is always 0.	—
4	1: The DP slave does not support the requested function (SYNC/FREEZE, for example).	<ul style="list-style-type: none"> • Check the configuration.
5	1: The bit is "1" when reading the station status from the DP master	<ul style="list-style-type: none"> • DP master is unable to interpret the response of the DP slave.
6	1: The DP slave type does not match the software configuration.	<ul style="list-style-type: none"> • Compare your online and offline configuration.
7	1: Parameters have been assigned to the DP slave by a DP master other than the one currently accessing the DP slave.	<ul style="list-style-type: none"> • The bit is always set to "1", for example, when you access the DP slave with the programming device or another DP master. <p>The "master PROFIBUS address" diagnostic byte contains the PROFIBUS address of the DP master that assigned parameters to the DP slave.</p>

Station status 2

Table 6- 4 Configuration of ET 200eco station status 2 (byte 1)

Bit	Meaning
0	1: The DP slave must be assigned new parameters.
1	1: Received a diagnostic message. The DP slave freezes its functions until the fault has been corrected (static diagnostic message).
2	1: The bit is always "1" at the DP slave.
3	1: Response monitoring is enabled for this DP slave.
4	1: The DP slave has received a "FREEZE" control command.*
5	1: The DP slave has received a "SYNC" control command.*
6	1: The bit is always "0."
7	1: When reading the station status from the DP master the bit is "1" if the DP slave is disabled at the DP master. The DP is disabled, which means it is isolated from the current processing.
* The "FREEZE" control command also freezes the diagnostic messages.	

Station status 3

Table 6- 5 Configuration of ET 200eco station status 3 (byte 2)

Bit	Meaning
0 to 7	0: The bits are always "0."

6.2.5 Master PROFIBUS address

Definition

Diagnostics byte 3 is used to store the PROFIBUS address of the DP master:

- which has assigned parameters to the DP slave, and
- has read / write access to the DP slave

FF_H in byte 3

If byte 3 of the master's PROFIBUS address contains the value FF_H, the DP master has not assigned any parameters to the DP slave.

6.2.6 Manufacturer ID

Definition

The manufacturer ID contains a code that describes the DP slave type.

Manufacturer ID

Table 6- 6 Configuration of the ET 200eco manufacturer ID (bytes 4 and 5)

Byte 4	Byte 5	Manufacturer ID for
80 _H	DB _H	ET 200eco 8 DI
80 _H	DA _H	ET 200eco 16 DI
80 _H	DD _H	ET 200eco 8 DO 2A
80 _H	FB _H	ET 200eco 16 DO 0.5A
80 _H	DC _H	ET 200eco 8 DI / 8 DO 2A
80 _H	FC _H	ET 200eco 8 DI / 8 DO 1.3A

6.2.7 Device-specific diagnostics

Definition

Based on device-specific diagnostics data, you can identify a short-circuit at the electronics / sensor supply 1L+ or a missing load voltage supply 2L+. The length of device-specific diagnostics data is defined in the header.

Device-specific diagnostics

Configuration of device-specific diagnostics for ET 200eco:

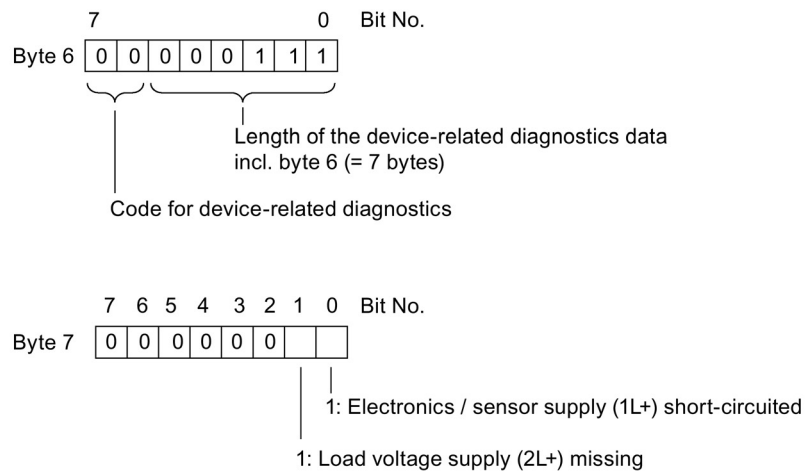


Figure 6-3 Configuration of device-specific diagnostics for ET 200eco

General specifications

7.1 Standards and Approvals

PROFIBUS standard

The ET 200eco distributed I/O system is based on the IEC 61784-1 standard.

IEC 61131-2

The ET 200eco Distributed I/O System meets the requirements and criteria of the IEC 61131-2 standard.

CE Label



Our products fulfill the requirements and safety objectives of the following EC Directives and comply with the harmonized European standards (EN) published for programmable logic controllers in the official journals of the European Communities:

- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)

The EC Declarations of Conformity are kept available for the responsible authorities at:

Siemens Aktiengesellschaft
Automation and Drives
A & D AS RD 4
PO Box 1963
D-92209 Amberg

Tick mark for Australia



Our products are compliant with requirements to AS/NZS 2064 Class A.

cULus approval



Underwriters Laboratories Inc., in accordance with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)

NEMA classification (for the US market)

The ET 200eco distributed I/O device meets the NEMA classification: Enclosure rating Type: 4X-indoor use only.

7.2 EMC compatibility, shipping and storage conditions

Definition

Electromagnetic compatibility is the ability of an electrical device to function in its electromagnetic environment in a satisfactory manner without affecting this environment.

The ET 200eco Distributed I/O Device also meets the requirements of the EMC law of the EEC. Prerequisite is that the electrical configuration of the ET 200eco Distributed I/O Device complies with current regulations and directives.

Pulse-shaped disturbance

The table below shows the EMC compatibility of the ET 200eco Distributed I/O Device with respect to pulse-shaped disturbances.

Table 7- 1 Pulse-shaped disturbance

Pulse-shaped disturbance	Test voltage	corresponds with degree of severity
Electrostatic discharge according to IEC 61000-4-2.	8 kV 6 kV	3 (air discharge) 2 (contact discharge)
Burst pulses (high-speed transient disturbance) to IEC 61000-4-4.	2 kV (power supply line) 2 kV (signal line)	3 3
High-energy surge to IEC 61000-4-5 Only with lightning protection elements (see DP master manual and description of SIMATIC NET PROFIBUS networks)		3
<ul style="list-style-type: none"> • Asymmetric coupling • Symmetric coupling 	2 kV (power supply line) 2 kV (signal / data line) 1 kV (power supply line) 1 kV (signal / data line)	

Sinusoidal disturbance

The table below shows the EMC compatibility of the ET 200eco Distributed I/O Device with respect to sinusoidal disturbance.

Table 7- 2 Sinusoidal disturbance

RF radiation to IEC 61000-4-3 Electromagnetic RF field		HF coupling according to IEC 61000-4-6
Amplitude modulated	Pulse modulated	
80 MHz to 1000 MHz	900 MHz \pm 5 MHz	0.15 MHz to 80 MHz
10 V/m		10 V _{rms} unmodulated
80 % AM (1 kHz)	50 % ED	80 % AM (1 kHz)
	200 Hz repetition rate	150 Ω source impedance

Emission of radio interference

The table below shows the emitted interference of electromagnetic fields according to EN 55011: Limit class A, group 1 (measured at a distance of 10 m).

Table 7- 3 Emission of radio interference

Frequency	Noise emission
30 MHz to 230 MHz	< 40 dB (µV/m) Q
230 MHz to 1000 MHz	< 47 dB (µV/m) Q

Shipping and storage conditions

The ET 200eco Distributed I/O Device surpasses shipping and storage requirements to IEC 61131-2. The table below contains information on transportation and storage conditions that apply to modules in original packaging.

Table 7- 4 Shipping and storage conditions

Type of condition	Permissible range
Free fall	≤ 1 m
Temperature	from -40 °C to +70 °C
Temperature change	20 K/h
Air pressure	1080 hPa to 660 hPa (corresponds to an altitude of -1000 m to 3500 m)
Relative humidity	5% to 95%, without condensation

7.3 Mechanical and climatic environmental conditions

Climatic environmental conditions

The table below shows the climatic environmental conditions.

Table 7- 5 Climatic environmental conditions

Environmental conditions	Fields of application	Remarks
Temperature	0° C to 55° C	All mounting positions
Temperature change	10 K/h	---
Relative humidity	from 5% to max. 100%	With condensation
Air pressure	1080 hPa to 795 hPa	Corresponds to an altitude of -1000 m to 2000 m
Pollutant concentration	SO ₂ : < 0.5 ppm; relative humidity < 60 %, no dewing H ₂ S: < 0.1 ppm; relative humidity < 60 %, no dewing	---

Mechanical environmental conditions

The table below shows the mechanical environmental conditions in the form of sinusoidal oscillations.

Table 7- 6 Mechanical environmental conditions

Frequency band	Continuous	Tested at ...
$10 \leq f \leq 58$ Hz	0.35 mm amplitude	0.75 mm amplitude
$58 \leq f \leq 150$ Hz	5 g constant acceleration	10 g constant acceleration

Tests of mechanical environmental conditions

The table below provides information about the type and scope of the tests of mechanical environmental conditions.

Table 7- 7 Tests of mechanical environmental conditions

Test ...	Test standard	Terminal / electronic modules
Vibration	Vibration test according to IEC 60068-2-6	Type of vibration: Frequency sweeps at a rate of change of 1 octave/minute. 10 Hz ≤ f ≤ 58 Hz, constant amplitude 0.75 mm 58 Hz ≤ f ≤ 150 Hz, constant acceleration 10 g Duration of vibration: 10 frequency sweeps per axis in each of three perpendicular axes
Shock	Shock, tested to IEC 60068-2-27	Shock method: half-sine Strength of shock: 30 g peak value, 18 ms duration Direction of shock: 3 shocks in each +/- direction at each of the three vertically aligned axes
Continuous shock	Shock, tested to IEC 60068-29	Shock method: half-sine Strength of shock: 25 g peak value, 6 ms duration Direction of shock: 1000 shocks in each +/- direction at each of the three vertically aligned axes

7.4 Specifications for insulation tests, protection class, degree of protection, and rated voltage

Test voltage

Proof of dielectric strength must be provided in the type test at a test voltage to IEC 61131-2:

Circuits with rated voltage V_N against other circuits or ground	Test voltage
< 50 V	500 V DC
< 150 V	2500 V DC
< 250 V	4000 V DC

Pollution degree/overvoltage category according to IEC 61131-2

- Pollution degree 2
- Overvoltage category at $U_N = 24$ V DC: II

Protection class according to IEC 61010-2

- Protection class I

Degree of protection IP65

Degree of protection according to IEC 60529

- Protection against the ingress of dust and full touch protection
- Protection against water jet directed onto the enclosure from all directions (water may not cause damage)

Degree of protection IP66 and IP67

Degree of protection according to IEC 60529

- Protection against the ingress of dust and full touch protection
- IP66: Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.
- IP67: Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time

Rated voltage for operation

The table below shows the rated voltage and corresponding tolerances for operation of the ET 200eco Distributed I/O Device.

Rated voltage	Tolerance
24 V DC (SELV/PELV)	20.4 V DC to 28.8 V DC

Note

The following applies to an ECOFAST terminating resistor:

Proper functioning of the terminating resistor can only be ensured if the electronics / sensor supply (1L+) does not exceed a tolerance of $\pm 10\%$.

Technical specifications

8.1 Overview

Contents

ET 200eco consists of various components. This chapter contains their specifications.

8.2 ECOFAST terminal block (6ES7194-3AA00-0AA0)

Properties

Properties of the ECOFAST terminal block:

- For insertion and screw mounting on any I/O module.
- Connection of supply voltages and PROFIBUS DP via ECOFAST connector (at socket X01, power supply).
- Connection for looping the supply voltages and PROFIBUS DP to the next PROFIBUS node using an additional ECOFAST connector (at the "loop-through" socket X02).
- Internal connection between feed line socket X01 and loop-through socket X02 (T-functionality).
- Adjustable PROFIBUS address (1 to 99) using a configuration connector.

Terminal assignment of the ECOFAST sockets

The table below shows the terminal assignment of the two ECOFAST sockets for connecting the supply voltages and PROFIBUS DP.

Table 8- 1 Pin-out of the X01 and X02 sockets

Pin	Assignment		View of the socket (front view of the terminal block)
	Feed male connector X01	Loop-through socket X02	
A	PROFIBUS DP signal A		
B	PROFIBUS DP signal B		
1	1L+ electronics / sensor supply		
2	Electronics/sensor supply ground (1M)		
3	Load voltage ground (2M)		
4	2L+ load voltage supply		

Block diagram

The diagram below shows the ECOFAST terminal block.

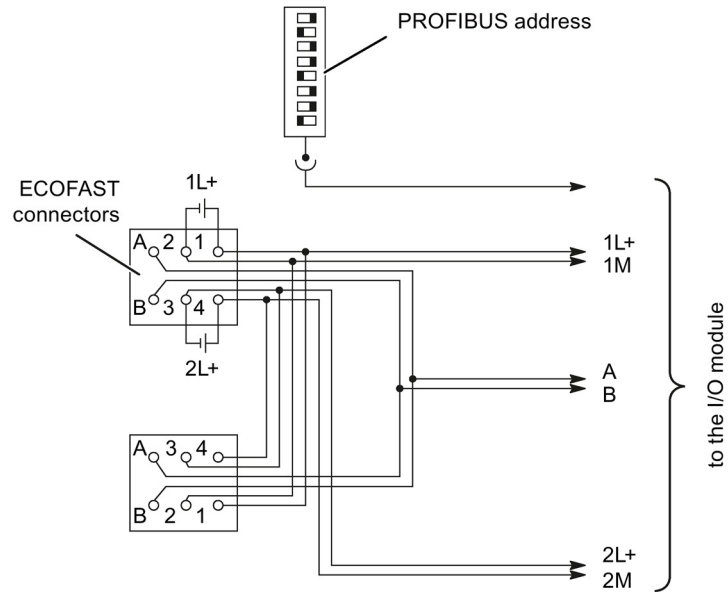


Figure 8-1 Block diagram of the ECOFAST terminal block

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	79 × 60 × 30
Weight	Approx. 313 g
Power loss	
Power loss of the module	Typ. 2 W ¹
¹ The power loss depends on the current looped through via the terminal block.	

Note

The maximum feed current should not exceed 8 A with 1L+ and 10 A with 2L+.

8.3 M12, 7/8" terminal block (6ES7194-3AA00-0BA0)

Properties

Properties of the M12, 7/8" terminal block:

- For insertion and screw mounting on any I/O module.
- Connection of
 - PROFIBUS DP via M12 connector (at feed line socket DP1)
 - Supply voltages via 7/8" connector (at feed line socket X01)
- Connection for looping the supply voltages and PROFIBUS DP to the next PROFIBUS node using an additional M12 or 7/8" connector (at the "loop-through" sockets DP2 or X02).
- Internally interconnected feed line sockets DP1 or X01 and loop-through sockets DP2 or X02 (T-functionality).
- Adjustable PROFIBUS address (1 to 99, two rotary selector switches).

Terminal assignment of the M12, 7/8" sockets

The tables below show the terminal assignment of the two M12, 7/8" sockets for connecting the supply voltages and PROFIBUS DP.

Table 8- 2 Pin-out of the DP1 and DP2 (M12) connectors

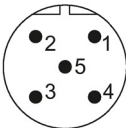
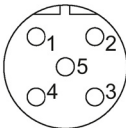
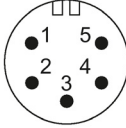
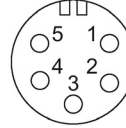
Pin	Pin-out of the M12 feed line socket DP1 and loop-through socket DP2 (PROFIBUS DP)	View of the connector (front view of the terminal block)	
1	Power supply + (P5V2)	Infeed DP1	Loop-through DP2
2	Data channel A (RxD/TxD-N)		
3	Data reference potential (M5V2)	Pin	Socket
4	Data channel B (RxD/TxD-P)		
5	Shielding		
Thread	Shielding		

Table 8- 3 Pin-out of the X01 and X02 connectors (7/8")

Pin	Pin-out of the 7/8" feed line socket X01 and loop-through socket X02 (PROFIBUS DP)	View of the connector (front view of the terminal block)	
1	Load voltage ground (2M)	Infeed X01	Loop-through X02
2	Electronics / sensor supply ground (1M)		
3	PE	Pin	Socket
4	1L+ electronics / sensor supply		
5	2L+ load voltage supply		

Block diagram

The diagram below shows the M12, 7/8" terminal block.

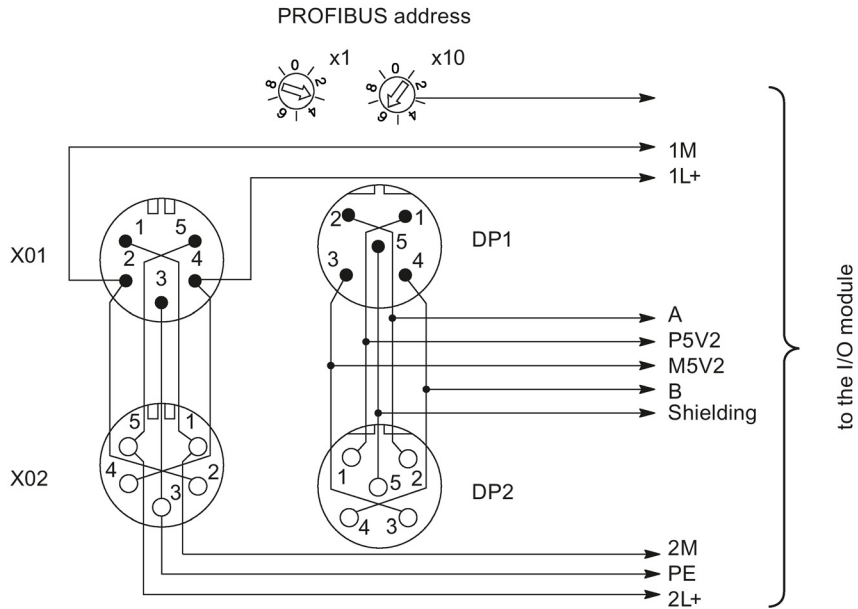


Figure 8-2 Block diagram of the M12, 7/8" terminal block

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	79 × 60 × 29
Weight	Approx. 392 g
Power loss	
Power loss of the module	Typ. 2 W ¹
¹ The power loss depends on the current looped through via the terminal block.	

Note

The maximum feed current should not exceed 6 A with 1L+ and 8 A with 2L+.

8.4 I/O module 8 DI (6ES7141-3BF00-0XA0)

Properties

Properties of the I/O module 8 DI:

- 8 digital inputs
- Rated input voltage 24V DC
- Suitable for switches and proximity switches (BEROs)

Terminal assignment of the DI sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital inputs.

Table 8- 4 Pin-out of the digital input sockets X1 to X8

Assignment					Front view of the socket
Pin	Socket X1	Socket X2	Socket X3	Socket X4	
1	24 V sensor supply				
2	n.c.				
3	Ground for sensor supply				
4	Input signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	24 V sensor supply				
2	n.c.				
3	Ground for sensor supply				
4	Input signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
5	PE				

Block diagram

The block diagram below shows the I/O module 8 DI.

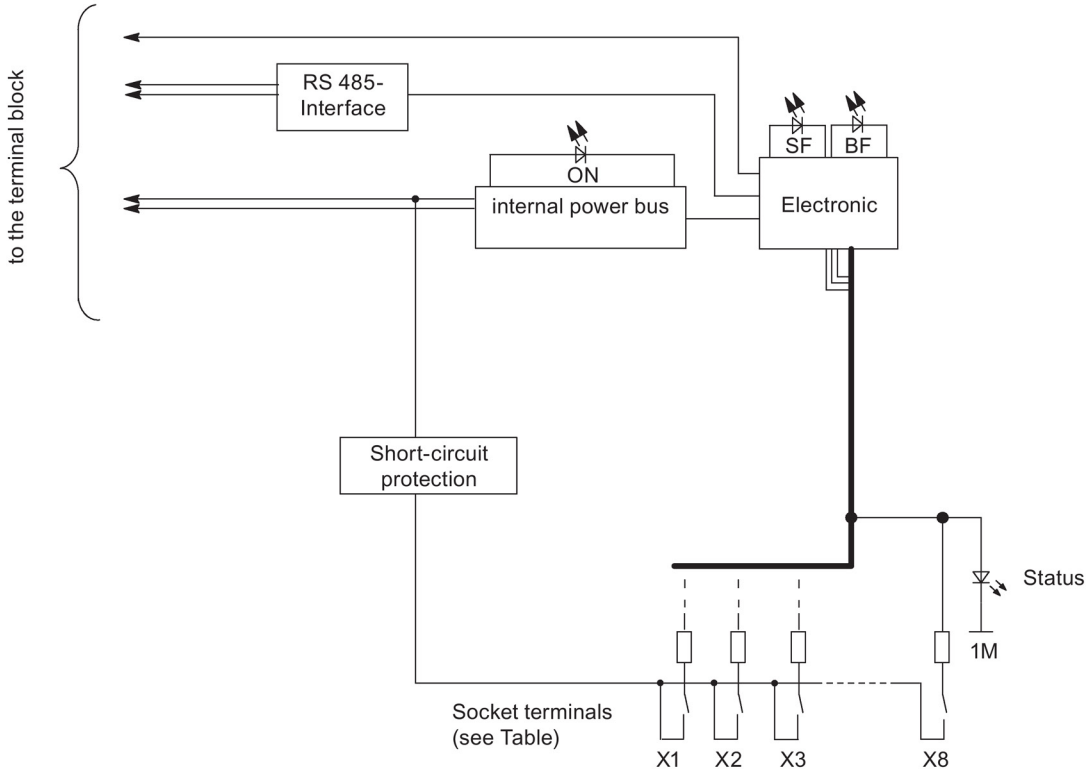


Figure 8-3 Block diagram of I/O module 8 DI

Technical specifications of I/O module 8 DI

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	8 digital inputs
Cable length • unshielded	Max. 30 m
Manufacturer ID	80DB _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
• Reverse polarity protection	Yes
Number of simultaneously controllable inputs	8
• All mounting positions	up to 55 °C
Electrical isolation	
• Between channels	No
• between PROFIBUS DP and all other circuitry	Yes
Permitted potential difference	
• Between different electric circuits	75 V DC, 60 V AC
Isolation test voltage	500 V DC
Current consumption • From supply voltage 1L+	Typ. 70 mA
Power loss of the module	Typ. 2.4 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	
• Group error display	red LED (SF)
• Channel error display	No
• Diagnostic information can be read	Supported
Sensor supply outputs	
Number of outputs	8
Output current	Up to 55 °C max. 1 A (total current)
Short-circuit protection	Yes, electronic

Technical specifications	
Sensor selection data	
Input voltage <ul style="list-style-type: none"> • Rated value • for "1" signal • for "0" signal 	24 V DC 13 to 30 V -3 to 5 V
Input current <ul style="list-style-type: none"> • at "1" signal • at "0" signal 	Typ. 7 mA
Input delay <ul style="list-style-type: none"> • At "0" to "1" transition • At "1" to "0" transition 	Typ. 3 ms Typ. 3 ms
Input characteristics	According to IEC 61131-2, Type 1
Connection of 2-wire BEROs	Supported
<ul style="list-style-type: none"> • Permitted quiescent current 	Max. 1.5 mA

8.5 I/O module 16 DI (6ES7141-3BH00-0XA0)

Properties

Properties of the I/O module 16 DI:

- 16 digital inputs
- Rated input voltage 24V DC
- Suitable for switches and proximity switches (BEROs)

Terminal assignment of the DI sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital inputs.

Table 8- 5 Pin-out of the digital input sockets X1 to X8

	Assignment				Front view of the socket
Pin	Socket X1	Socket X2	Socket X3	Socket X4	
1	24 V sensor supply				
2	Input signal				
	Channel 8	Channel 9	Channel 10	Channel 11	
3	Ground for sensor supply				
4	Input signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	24 V sensor supply				
2	Input signal				
	Channel 12	Channel 13	Channel 14	Channel 15	
3	Ground for sensor supply				
4	Input signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
5	PE				

Block diagram

The block diagram below shows the I/O module 16 DI.

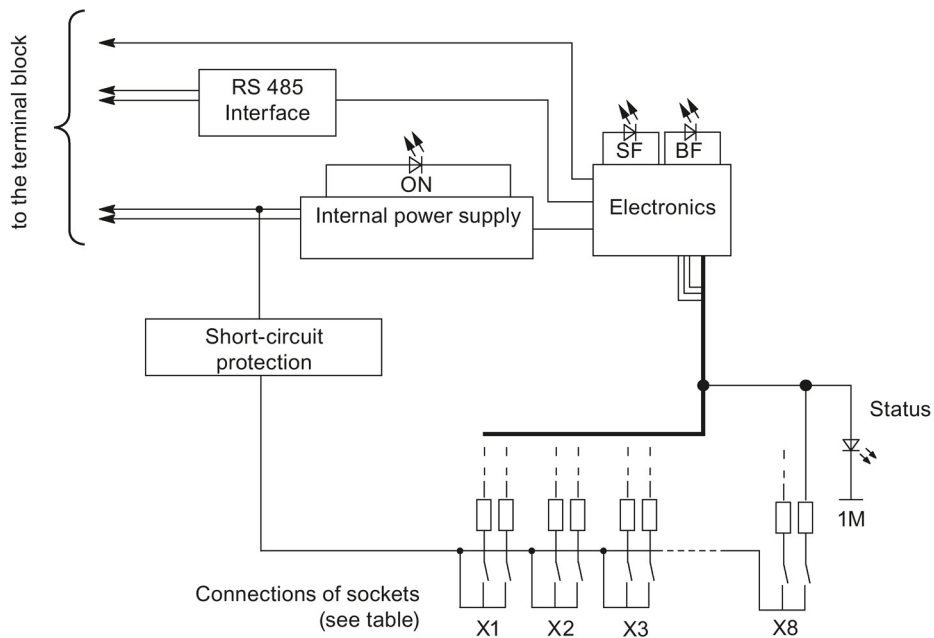


Figure 8-4 Block diagram of I/O module 16 DI

Technical specifications of I/O module 16 DI

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	16 digital inputs
Cable length	Max. 30 m
• unshielded	
Manufacturer ID	80DA _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
• Reverse polarity protection	Yes
Number of simultaneously controllable inputs	16
• All mounting positions	up to 55 °C
Electrical isolation	
• Between channels	No
• between PROFIBUS DP and all other circuitry	Yes
Permitted potential difference	
• Between different electric circuits	75 V DC, 60 V AC
Isolation test voltage	500 V DC
Current consumption	Typ. 70 mA
• From supply voltage 1L+	
Power loss of the module	Typ. 3.6 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	
• Group error display	red LED (SF)
• Channel error display	No
• Diagnostic information can be read	Supported
Sensor supply outputs	
Number of outputs	8
Output current	Up to 55 °C max. 1 A (total current)
Short-circuit protection	Yes, electronic

Technical specifications	
Sensor selection data	
Input voltage <ul style="list-style-type: none">• Rated value• for "1" signal• for "0" signal	24 V DC 13 to 30 V -3 to 5 V
Input current <ul style="list-style-type: none">• at "1" signal• at "0" signal	Typ. 7 mA
Input delay <ul style="list-style-type: none">• At "0" to "1" transition• At "1" to "0" transition	Typ. 3 ms Typ. 3 ms
Input characteristics	According to IEC 61131-1, Type 1
Connection of 2-wire BEROs	Supported
<ul style="list-style-type: none">• Permitted quiescent current	Max. 1.5 mA

8.6 I/O module 8 DO 2A (6ES7142-3BF00-0XA0)

Properties

Properties of the I/O module 8 DO 2A:

- 8 digital outputs
- Output current 2 A per output
- Rated load voltage 24 V DC
- Suitable for solenoid valves, DC contactors and indicator lights

Terminal assignment of the DO sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital outputs.

Table 8- 6 Pin-out of the digital output sockets X1 to X8

	Assignment				Front view of the socket
Pin	Socket X1	Socket X2	Socket X3	Socket X4	
1	n.c.				
2	n.c.				
3	Load voltage ground (2M)				
4	Output signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	n.c.				
2	n.c.				
3	Load voltage ground (2M)				
4	Output signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
5	PE				

Block diagram

The block diagram below shows the I/O module 8 DO 2A.

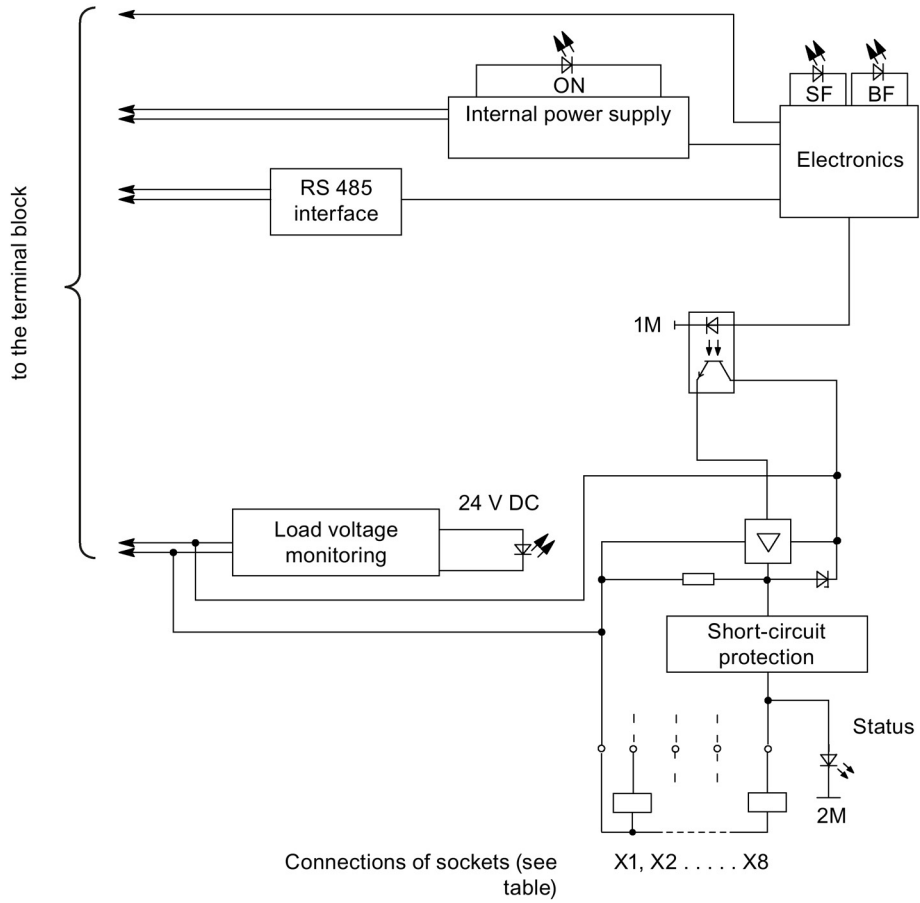


Figure 8-5 Block diagram of I/O module 8 DO 2A

Technical specifications of I/O module 8 DO 2A

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	8 digital outputs
Cable length	Max. 30 m
<ul style="list-style-type: none"> unshielded 	
Manufacturer ID	80DD _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
2L+ rated load voltage	24 V DC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
Total current of the outputs	
<ul style="list-style-type: none"> All mounting positions 	4 A each ^{1) 2)} up to 55 °C
Electrical isolation	
<ul style="list-style-type: none"> Between channels 	No
<ul style="list-style-type: none"> between PROFIBUS DP and all other circuitry 	Yes
Permitted potential difference	
<ul style="list-style-type: none"> Between different electric circuits 	75 V DC, 60 V AC
Isolation test voltage	500 V DC
Current consumption	
<ul style="list-style-type: none"> From supply voltage 1L+ from 2L+ rated load voltage 	Typ. 70 mA Typ. 60 mA
Power loss of the module	Typ. 4 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	
<ul style="list-style-type: none"> Group error display 	red LED (SF)
<ul style="list-style-type: none"> Channel error display 	No
<ul style="list-style-type: none"> Diagnostic information can be read 	Supported

Technical specifications	
Actuator selection data	
Output voltage at "1" signal	Min. 2L+ (-0.8 V)
Output current	
• at "1" signal	2 A
• at "0" signal (residual current)	Max. 0.5 mA
Load resistance range	12 Ω to 4 kΩ
Lamp load	Max. 10 W
Wiring 2 outputs in parallel	
• for redundant load control	Supported
• For performance increase	Not supported
Control of a digital input	Supported
Switching frequency	
• with resistive load	Max. 100 Hz
• with inductive load to IEC 947-5-1, DC13	Max. 0.5 Hz
• with lamp load	Max. 1 Hz
Internal limiting of the inductive shutdown voltage to	Typ. 2L+ (-44 V)
Short-circuit protection of output	Yes, electronic
• Response threshold	Typ. 4 A (per channel)
¹ 4 A total current for sockets X1, X3, X5, X7 and 4 A total current for sockets X2, X4, X6 and X8. ² Observe the current carrying capacity of the cable.	

8.7 I/O module 16 DO 0.5A (6ES7142-3BH00-0XA0)

Properties

Properties of the I/O module 16 DO 0.5A:

- 16 digital outputs
- Output current 0.5 A per output
- Rated load voltage 24 V DC
- Suitable for solenoid valves, DC contactors and indicator lights

Terminal assignment of the DO sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital outputs.

Table 8- 7 Pin-out of the digital output sockets X1 to X8

Pin	Assignment				Front view of the socket
	Socket X1	Socket X2	Socket X3	Socket X4	
1	n.c.				
2	Output signal				
	Channel 8	Channel 9	Channel 10	Channel 11	
3	Load voltage ground (2M)				
4	Output signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	n.c.				
2	Output signal				
	Channel 12	Channel 13	Channel 14	Channel 15	
3	Load voltage ground (2M)				
4	Output signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
5	PE				

Block diagram

The block diagram below shows the I/O module 16 DO 0.5A.

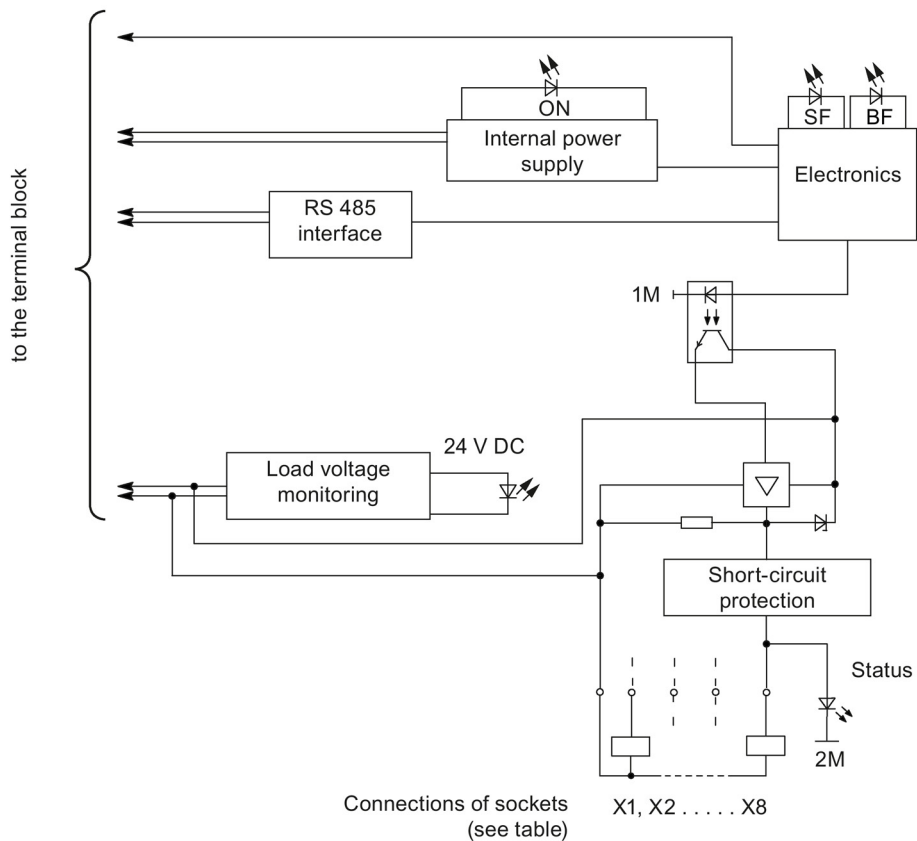


Figure 8-6 Block diagram of I/O module 16 DO 0.5A

Technical specifications of I/O module 16 DO 0.5A

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	16 digital outputs
Cable length	Max. 30 m
• unshielded	
Manufacturer ID	80FB _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
• Reverse polarity protection	Yes
2L+ rated load voltage	24 V DC
• Reverse polarity protection	Yes
Total current of the outputs	4A ¹⁾ up to 55 °C
• All mounting positions	
Electrical isolation	
• Between channels	No
• between PROFIBUS DP and all other circuitry	Yes
Permitted potential difference	
• Between different electric circuits	75 V DC, 60 V AC
Isolation test voltage	500 V DC
Current consumption	Typ. 70 mA Typ. 80 mA
• From supply voltage 1L+	
• from 2L+ rated load voltage	
Power loss of the module	Typ. 4 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	
• Group error display	red LED (SF)
• Channel error display	No
• Diagnostic information can be read	Supported

Technical specifications	
Actuator selection data	
Output voltage at "1" signal	Min. 2L+ (-0.8 V)
Output current	
• at "1" signal	0.5 A
• at "0" signal (residual current)	Max. 0.1 mA
Load resistance range	48 Ω to 4 kΩ
Lamp load	Max. 5 W
Wiring 2 outputs in parallel	
• for redundant load control	Supported
• For performance increase	Not supported
Control of a digital input	Supported
Switching frequency	
• with resistive load	Max. 100 Hz
• with inductive load to IEC 947-5-1, DC13	Max. 0.5 Hz
• with lamp load	Max. 1 Hz
Internal limiting of the inductive shutdown voltage to	Typ. 2L+ (-47 V)
Short-circuit protection of output	Yes, electronic
• Response threshold	Typ. 1.4 A (per channel)
¹ Observe the current carrying capacity of the cable.	

8.8 I/O module 8 DI / 8 DO 2A (6ES7143-3BH00-0XA0)

Properties

Properties of the I/O module 8 DI / 8 DO 2A:

- 8 digital inputs
- Rated input voltage 24V DC
- Suitable for switches and proximity switches (BEROs)
- 8 digital outputs
- Output current 2 A per output
- Rated load voltage 24 V DC
- Suitable for solenoid valves, DC contactors and indicator lights

Terminal assignment of the DI sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital inputs and outputs.

Table 8- 8 Pin-out of the digital I/O sockets X1 to X8

Assignment					Front view of the socket
Pin	Socket X1	Socket X2	Socket X3	Socket X4	
1	24 V sensor supply				
2	Input signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
3	Sensor / load voltage supply ground				
4	Output signal				
	Channel 0	Channel 1	Channel 2	Channel 3	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	24 V sensor supply				
2	Input signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
3	Sensor / load voltage supply ground				
4	Output signal				
	Channel 4	Channel 5	Channel 6	Channel 7	
5	PE				

Block diagram

The block diagram below shows the I/O module 8 DI / 8 DO 2A.

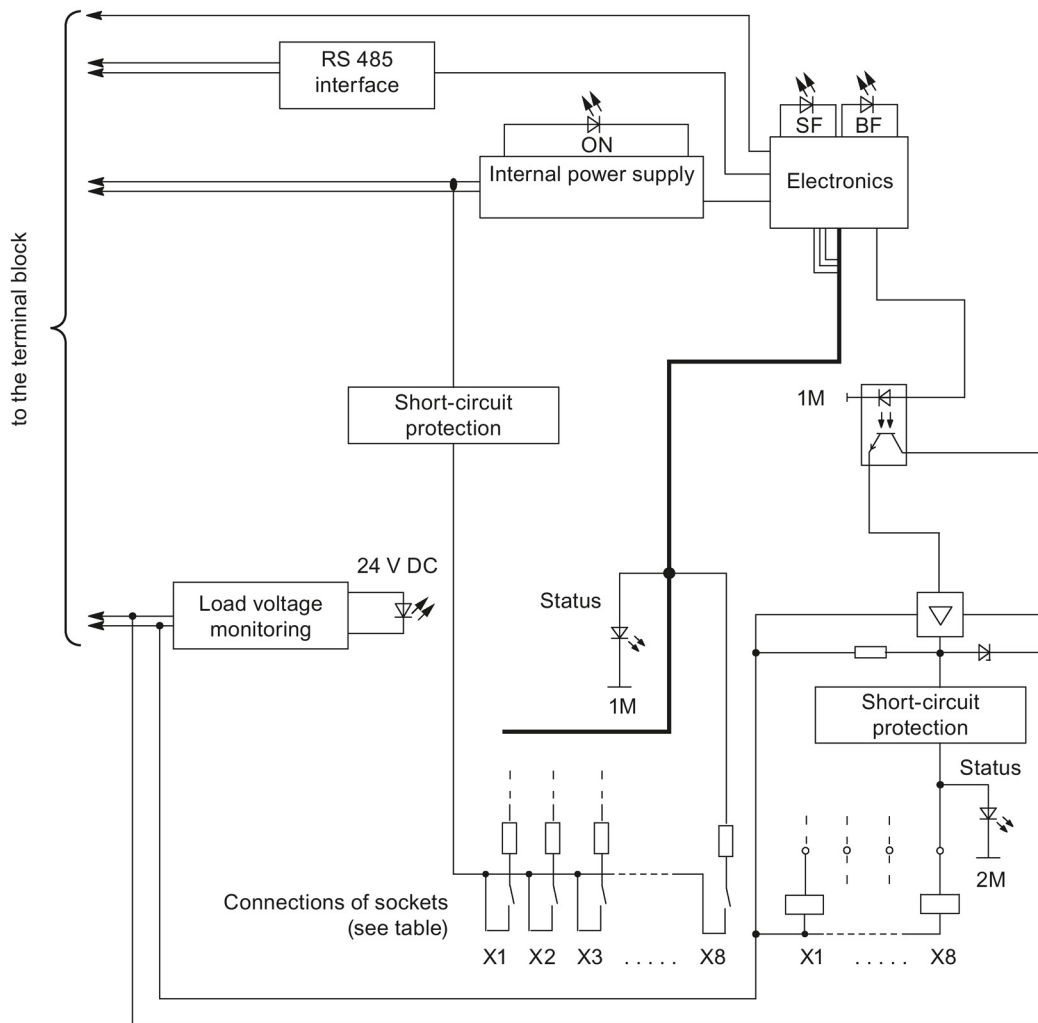


Figure 8-7 Block diagram of I/O module 8 DI / 8 DO 2A

Technical specifications of the I/O module 8 DI / 8 DO 2A

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	8 digital inputs and 8 digital outputs
Cable length	Max. 30 m
• unshielded	
Manufacturer ID	80DC _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
• Reverse polarity protection	No
2L+ rated load voltage	24 V DC
• Reverse polarity protection	No
Number of simultaneously controllable inputs	8
• All mounting positions	up to 55 °C
Total current of the outputs	4 A each ^{1) 2)} up to 55 °C
• All mounting positions	
Electrical isolation	Yes
• Between channels	
• between PROFIBUS DP and all other circuitry	
Permitted potential difference	75 V DC, 60 V AC
• Between different electric circuits	
Isolation test voltage	500 V DC
Current consumption	Typ. 70 mA Typ. 60 mA
• From supply voltage 1L+	
• from 2L+ rated load voltage	
Power loss of the module	Typ. 5 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	red LED (SF)
• Group error display	
• Channel error display	No
• Diagnostic information can be read	Supported

Technical specifications	
Sensor supply outputs	
Number of outputs	8
Output current	Up to 55 °C max. 0.75 A (total current)
Short-circuit protection	Yes, electronic
Sensor selection data	
Input voltage	
<ul style="list-style-type: none"> • Rated value • for "1" signal • for "0" signal 	24 V DC 13 to 30 V -3 to 5 V
Input current	
<ul style="list-style-type: none"> • at "1" signal • at "0" signal 	Typ. 7 mA
Input delay	
<ul style="list-style-type: none"> • At "0" to "1" transition • At "1" to "0" transition 	Typ. 3 ms Typ. 3 ms
Input characteristics	According to IEC 61131-2, Type 1
Connection of 2-wire BEROs	Supported
<ul style="list-style-type: none"> • Permitted quiescent current 	Max. 1.5 mA
Actuator selection data	
Output voltage at "1" signal	Min. 2L+ (-0.8 V)
Output current	
<ul style="list-style-type: none"> • at "1" signal • at "0" signal (residual current) 	2 A Max. 0.5 mA
Load resistance range	18.5 Ω to 4 kΩ
Lamp load	Max. 10 W
Wiring 2 outputs in parallel	
<ul style="list-style-type: none"> • for redundant load control • For performance increase 	Supported Not supported
Control of a digital input	Supported
Switching frequency	
<ul style="list-style-type: none"> • with resistive load • with inductive load to IEC 947-5-1, DC13 • with lamp load 	Max. 100 Hz Max. 0.5 Hz Max. 1 Hz
Internal limiting of the inductive shutdown voltage to	Typ. 2L+ (-44 V)
Short-circuit protection of output	Yes, electronic
<ul style="list-style-type: none"> • Response threshold 	Typ. 4 A per channel
¹ 4 A total current for sockets X1, X3, X5, X7 and 4 A total current for sockets X2, X4, X6 and X8. ² Observe the current carrying capacity of the cable	

8.9 I/O module 8 DI / 8 DO 1.3A (6ES7143-3BH10-0XA0)

Properties

Properties of the I/O module 8 DI / 8 DO 1.3A:

- 8 digital inputs
- Rated input voltage 24V DC
- Suitable for switches and proximity switches (BEROs)
- 8 digital outputs
- Output current 1.3 A per output
- Rated load voltage 24 V DC
- Suitable for solenoid valves, DC contactors and indicator lights

Terminal assignment of the DI sockets

The table below shows the terminal assignment of the eight sockets for connection of the digital inputs and digital outputs.

Table 8- 9 Pin-out of the digital I/O sockets X1 to X8

	Assignment				Front view of the socket
Pin	Socket X1	Socket X2	Socket X3	Socket X4	
1	24 V sensor supply	n.c.	24 V sensor supply	n.c.	
2	Input signal channel 1	Output signal channel 1	Input signal channel 3	Output signal channel 3	
3	Ground for sensor supply	Load voltage supply ground	Ground for sensor supply	Load voltage supply ground	
4	Input signal channel 0	Output signal channel 0	Input signal channel 2	Output signal channel 2	
5	PE				
Pin	Socket X5	Socket X6	Socket X7	Socket X8	
1	24 V sensor supply	n.c.	24 V sensor supply	n.c.	
2	Input signal channel 5	Output signal channel 5	Input signal channel 7	Output signal channel 7	
3	Ground for sensor supply	Load voltage supply ground	Ground for sensor supply	Load voltage supply ground	
4	Input signal channel 4	Output signal channel 4	Input signal channel 6	Output signal channel 6	
5	PE				

Block diagram

The block diagram below shows the I/O module 8 DI / 8 DO 1.3A.

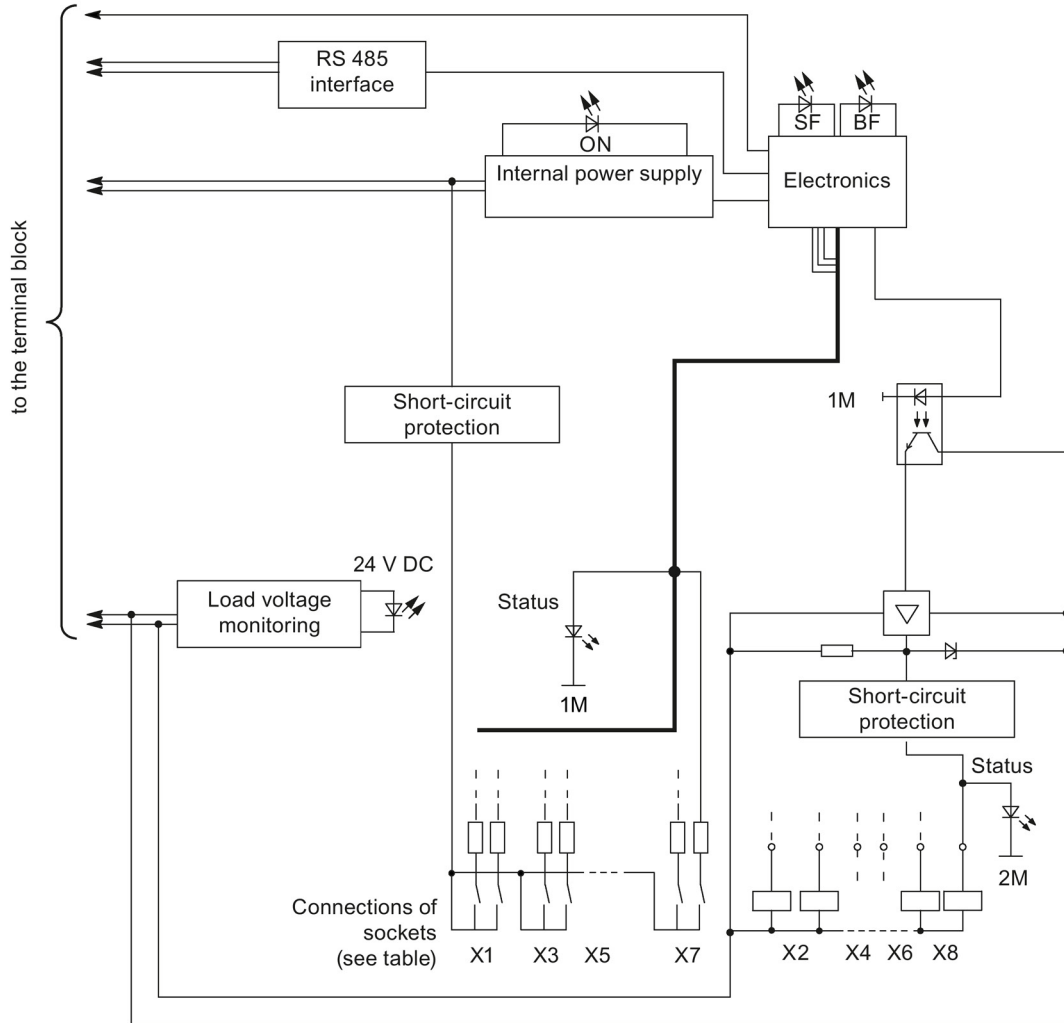


Figure 8-8 Block diagram of I/O module 8 DI / 8 DO 1.3A

Technical specifications of the I/O module 8 DI / 8 DO 1.3A

Technical specifications	
Dimensions and weight	
Dimensions W × H × D (mm)	60 × 210 × 28
Weight	Approx. 210 g
Module-specific data	
Transmission rates	9.6/19.2/45.45/93.75/187.5/500 kBaud 1.5/3/6/12 MBaud
Bus protocol	PROFIBUS DP
Number of channels	8 digital inputs and 8 digital outputs
Cable length	Max. 30 m
• unshielded	
Manufacturer ID	80FC _H
Voltages, currents, potentials	
Rated electronics / sensor supply voltage 1L+	24 V DC
• Reverse polarity protection	Yes
2L+ rated load voltage	24 V DC
• Reverse polarity protection	Yes
Number of simultaneously controllable inputs	8
• All mounting positions	up to 55 °C
Total current of the outputs	5.2 A ¹⁾ up to 55 °C
• All mounting positions	
Electrical isolation	Yes
• Between channels	
• between PROFIBUS DP and all other circuitry	
Permitted potential difference	75 V DC, 60 V AC
• Between different electric circuits	
Isolation test voltage	500 V DC
Current consumption	Typ. 70 mA Typ. 60 mA
• From supply voltage 1L+	
• from 2L+ rated load voltage	
Power loss of the module	Typ. 5 W
Status, interrupts, diagnostics	
Status display	green LED per channel
Alarms	No
Diagnostic functions	red LED (SF)
• Group error display	
• Channel error display	No
• Diagnostic information can be read	Supported

Technical specifications	
Sensor supply outputs	
Number of outputs	8
Output current	Up to 55 °C max. 1 A (total current)
Short-circuit protection	Yes, electronic
Sensor selection data	
Input voltage	
<ul style="list-style-type: none"> • Rated value • for "1" signal • for "0" signal 	24 V DC 13 to 30 V -3 to 5 V
Input current	
<ul style="list-style-type: none"> • at "1" signal • at "0" signal 	Typ. 7 mA
Input delay	
<ul style="list-style-type: none"> • At "0" to "1" transition • At "1" to "0" transition 	Typ. 3 ms Typ. 3 ms
Input characteristics	According to IEC 61131-2, Type 1
Connection of 2-wire BEROs	Supported
<ul style="list-style-type: none"> • Permitted quiescent current 	Max. 1.5 mA
Actuator selection data	
Output voltage at "1" signal	Min. 2L+ (-1.2 V)
Output current	
<ul style="list-style-type: none"> • at "1" signal • at "0" signal (residual current) 	1.3 A Max. 0.5 mA
Load resistance range	18.5 Ω to 4 kΩ
Lamp load	Max. 10 W
Wiring 2 outputs in parallel	
<ul style="list-style-type: none"> • for redundant load control • For performance increase 	Supported Not supported
Control of a digital input	Supported
Switching frequency	
<ul style="list-style-type: none"> • with resistive load • with inductive load to IEC 947-5-1, DC13 • with lamp load 	Max. 100 Hz Max. 0.5 Hz Max. 1 Hz
Internal limiting of the inductive shutdown voltage to	Typ. 2L+ (-44 V)
Short-circuit protection of output	Yes, electronic
<ul style="list-style-type: none"> • Response threshold 	Typ. 4 A per channel
¹ Observe the current carrying capacity of the cable.	

Appendix

A.1 Article numbers

Introduction

The tables below show the article numbers of all components of the ET 200eco automation system.

ET 200eco components

Table A- 1 ET 200eco components – article numbers

Description	Article number
I/O module 8 DI DC 24V; 8 X M12	6ES7141-3BF00-0XA0
I/O module 16 DI DC 24V; 8 X M12	6ES7141-3BH00-0XA0
I/O module 8 DO DC 24V/2A; 8 X M12	6ES7142-3BF00-0XA0
I/O module 16 DO DC 24V/0,5A; 8 X M12	6ES7142-3BH00-0XA0
I/O module 8 DI / 8 DO DC 24V/2A; 8 X M12	6ES7143-3BH00-0XA0
I/O module 8 DI / 8 DO DC 24V/1,3A; 8 X M12	6ES7143-3BH10-0XA0
Terminal block M12, 7/8"	6ES7194-3AA00-0BA0
ECOFAST terminal block	6ES7194-3AA00-0AA0

ET 200eco accessories

Table A- 2 ET 200eco accessories – article numbers

Description	Article number
Labels 20 mm x 7 mm	3RT1900-1SB2

Accessories for I/O modules

Table A- 3 Accessories for I/O modules – article numbers

Description	Article number	
Pre-assembled cables:		
• M12 connecting cable (PUR sheath), pre-assembled, socket and connector on both ends, 3 x 0.34 mm ²	1.5 m	3RK1902-4PB15-3AA0
• M12 connecting cable (PUR sheath), 5 x 0.34 mm ² , pre-assembled with socket on one end (socket on one end, other end open)	1.5 m	3RK1902-4HB15-5AA0
	5.0 m	3RK1902-4HB50-5AA0
	10.0 m	3RK1902-4HC01-5AA0
Miscellaneous:		
• M12 caps	3RX9802-0AA00	
	3RK1901-1KA00	
• Y-cable for connection of two I/Os	6ES7194-6KA00-0XA0	
• Y-connector M12, 5-pin (for the connection of two actuators and sensors to digital I/Os).	6ES7194-1KA01-0XA0	
• M12 connector, 5-pin, max. 0.75 mm ² , screw terminals	3RK1902-4BA00-5AA0	
• M12 connector, angular, 5-pin, max. 0.75 mm ² , screw terminals	3RK1902-4DA00-5AA0	

Accessories for the ECOFAST terminal block

Table A- 4 Accessories for the ECOFAST terminal block – article numbers

Description	Article number	
Pre-assembled cables		
<ul style="list-style-type: none"> ECOFAST hybrid cable (2 x Cu and 2x2 Cu, Ø 1.5 mm²), pre-assembled with ECOFAST connector, trailable 	0.5 m	6XV1830-7BH05
	1.0 m	6XV1830-7BH10
	1.5 m	6XV1830-7BH15
	3.0 m	6XV1830-7BH30
	5.0 m	6XV1830-7BH50
	10.0 m	6XV1830-7BN10
	15.0 m	6XV1830-7BN15
	20.0 m	6XV1830-7BN20
	25.0 m	6XV1830-7BN25
	30.0 m	6XV1830-7BN30
	35.0 m	6XV1830-7BN35
	40.0 m	6XV1830-7BN40
	45.0 m	6XV1830-7BN45
	50.0 m	6XV1830-7BN50
<ul style="list-style-type: none"> PROFIBUS ECOFAST hybrid cable GP, cable with 4xCu and 2xCu, shielded, pre-assembled with 2 ECOFAST connectors, trailable 	0.5 m	6XV1860-3PH05
	1.0 m	6XV1860-3PH10
	1.5 m	6XV1860-3PH15
	3.0 m	6XV1860-3PH30
	5.0 m	6XV1860-3PH50
	10.0 m	6XV1860-3PN10
	15.0 m	6XV1860-3PN15
	20.0 m	6XV1860-3PN20
	25.0 m	6XV1860-3PN25
	30.0 m	6XV1860-3PN30
	35.0 m	6XV1860-3PN35
	40.0 m	6XV1860-3PN40
	45.0 m	6XV1860-3PN45
	50.0 m	6XV1860-3PN50

Description	Article number	
Hybrid cable (for assembly by the customer)		
Connectors (not pre-assembled):		
• PROFIBUS ECOFAST Hybrid Plug 180 (ECOFAST Cu), female contact insert (for loop-through)	5 pieces	6GK1905-0CB00
• PROFIBUS ECOFAST Hybrid Plug 180 (ECOFAST Cu), female contact insert (angular)		6GK1905-0CD00
• PROFIBUS ECOFAST Hybrid Plug 180 (ECOFAST Cu), pin insert (for loop-through)	5 pieces	6GK1905-0CA00
• PROFIBUS ECOFAST Hybrid Plug 180 (ECOFAST Cu), pin insert (angular)		6GK1905-0CC00
Cables (not pre-assembled):		
• ECOFAST hybrid cable (2 x Cu, and 2x2 Cu), cut to length		6XV1830-7AH10
• ECOFAST hybrid cable, not pre-assembled (2 x Cu, and 2x2 Cu)	20 m	6XV1830-7AN20
	50 m	6XV1830-7AN50
	100 m	6XV1830-7AT10
• PROFIBUS ECOFAST hybrid cable GP, trailable cable with 4xCu and 2xCu, shielded, cut to length (max. delivery length 1000 m)		6XV1860-2P
• PROFIBUS ECOFAST hybrid cable GP, trailable cable with 4xCu and 2xCu, shielded	20 m	6XV1860-4PN20
	50 m	6XV1860-4PN50
	100 m	6XV1860-4PT10
Miscellaneous		
• Configuration connector for setting the PROFIBUS address (spare part)	1 piece	6ES7194-1KB00-0XA0
• ECOFAST terminating resistor for PROFIBUS DP	1 piece	6GK1905-0DA10
	5 pieces	6GK1905-0DA00
• ECOFAST caps	10 pieces	6ES7194-1JB10-0XA0

Accessories for the M12, 7/8" terminal block

Table A- 5 Accessories for the M12, 7/8" terminal block – article numbers

Description	Article number	
Pre-assembled cables		
<ul style="list-style-type: none"> Cable 5x1.5 mm² for the supply voltage, pre-assembled with 7/8" connectors 	0.3 m	6XV1822-5BE30
	0.5 m	6XV1822-5BE50
	1.0 m	6XV1822-5BH10
	1.5 m	6XV1822-5BH15
	2.0 m	6XV1822-5BH20
	3.0 m	6XV1822-5BH30
	5.0 m	6XV1822-5BH50
	10.0 m	6XV1822-5BN10
	15.0 m	6XV1822-5BN15
<ul style="list-style-type: none"> 7/8" connecting cable for power supply, trailable power line, 5 x 1.5 mm², pre-assembled on one end with 7/8" connector with female contact insert, angular (socket at one end, other end open) 	3.0 m	3RK1902-3GB30
	5.0 m	3RK1902-3GB50
	10.0 m	3RK1902-3GC10
<ul style="list-style-type: none"> 7/8" connecting cable for power supply, trailable power line, 5 x 1.5 mm², both ends prefabricated with 7/8" connectors, angular (socket at one end, pin at other end) 	3.0 m	3RK1902-3NB30
	5.0 m	3RK1902-3NB50
	10.0 m	3RK1902-3NC10
<ul style="list-style-type: none"> PROFIBUS M12 connecting cable, trailable cable pre-assembled at both ends with PROFIBUS M12 connectors 180 (socket on one end, pin on the other end) 	0.3 m	6XV1830-3DE30
	0.5 m	6XV1830-3DE50
	1.0 m	6XV1830-3DH10
	1.5 m	6XV1830-3DH15
	2.0 m	6XV1830-3DH20
	3.0 m	6XV1830-3DH30
	5.0 m	6XV1830-3DH50
	10.0 m	6XV1830-3DN10
	15.0 m	6XV1830-3DN15
<ul style="list-style-type: none"> PROFIBUS M12 connecting cable, trailable cable pre-assembled at both ends with PROFIBUS M12 connectors, angular (socket on one end, pin on the other end) 	3.0 m	3RK1902-1NB30
	5.0 m	3RK1902-1NB50
	10.0 m	3RK1902-1NC10

Description		Article number
Cable (for assembly by the customer)		
Connectors (not pre-assembled):		
• 7/8" connector, angular, with female contact insert		3RK1902-3DA00
• 7/8" connector, angular, with pin insert		3RK1902-3BA00
• PROFIBUS M12 connector, axial cable outlet, female contact insert (B-coded)	5 pieces	6GK1905-0EB00
• PROFIBUS FastConnect, M12 connector with rugged metal enclosure, axial cable outlet, for use with ET 200pro, female contact insert (B-coded)	5 pieces	6GK1905-0EB10
• M12 connection plug for ET 200 with axial cable outlet, for fabrication in the field, pin insert	5 pieces	6GK1905-0EA00
• PROFIBUS FastConnect, M12 connector with rugged metal enclosure, axial cable outlet, for use with ET 200pro, pin insert (B-coded)	5 pieces	6GK1905-0EA10
• 7/8" connection plug with axial cable outlet, for fabrication in the field, for ET 200, pin insert	5 pieces	6GK1905-0FA00
• 7/8" connection plug with axial cable outlet, for fabrication in the field, for ET 200, female contact insert	5 pieces	6GK1905-0FB00
Cables (not pre-assembled):		
• Power cable, trailable power cable, 5 x 1.5 mm ²		6XV1830-8AH10
• PROFIBUS FC standard cable (minimum order quantity 20 m)		6XV1830-0EH10
• PROFIBUS FC rugged cable (minimum order quantity 20 m)		6XV1830-0JH10
• PROFIBUS FC food cable (minimum order quantity 20 m)		6XV1830-0GH10
• PROFIBUS FC trailing cable (minimum order quantity 20 m)		6XV1830-3EH10
• FC FRNC cable (FRNC sheath)		6XV1830-0LH10
• FC underground cable		6XV1830-3FH10
• Festoon cable GP (PVC sheath)		6XV1830-3GH10
• FC flexible cable GP (PUR sheath)		6XV1831-2K
Miscellaneous		
• M12 caps		3RX9802-0AA00 3RK1901-1KA00
• M12 terminating resistor for PROFIBUS DP	5 pieces	6GK1905-0EC00
• 7/8" caps	10 pieces	6ES7194-3JA00-0AA0

Technical reference to PROFIBUS DP with SIMATIC S7 and STEP 7

Table A-6 Technical reference to PROFIBUS DP and SIMATIC S7

Technical reference	Article numbers	Contents
Distributed configuration with PROFIBUS DP – Aufbau, Projektierung und Einsatz des PROFIBUS-DP mit SIMATIC S7– (Structure, configuration, and use of PROFIBUS DP with SIMATIC S7) Josef Weigmann, Gerhard Kilian Publicis MCD Verlag, 2nd Edition, 2000	Commercial book number: ISBN 3-89578-123-1 At your local SIEMENS office: A19100-L531-B772	Instruction manual for getting started with PROFIBUS DP and with the implementation of automation tasks using PROFIBUS DP and SIMATIC S7. Shows many practical application examples of PROFIBUS DP applications based on SIMATIC S7.

A.2 Dimensional drawings

Introduction

The section below shows the dimension drawings of the most important components of ET 200eco.

I/O module installed with M12, 7/8" terminal block

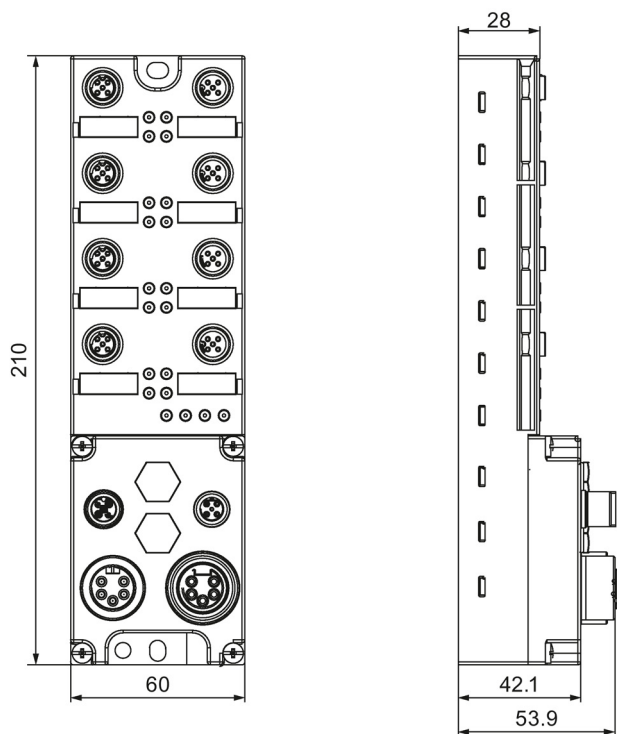


Figure A-1 Dimension drawing of the I/O module installed with M12, 7/8" terminal block

I/O module installed with ECOFAST terminal block

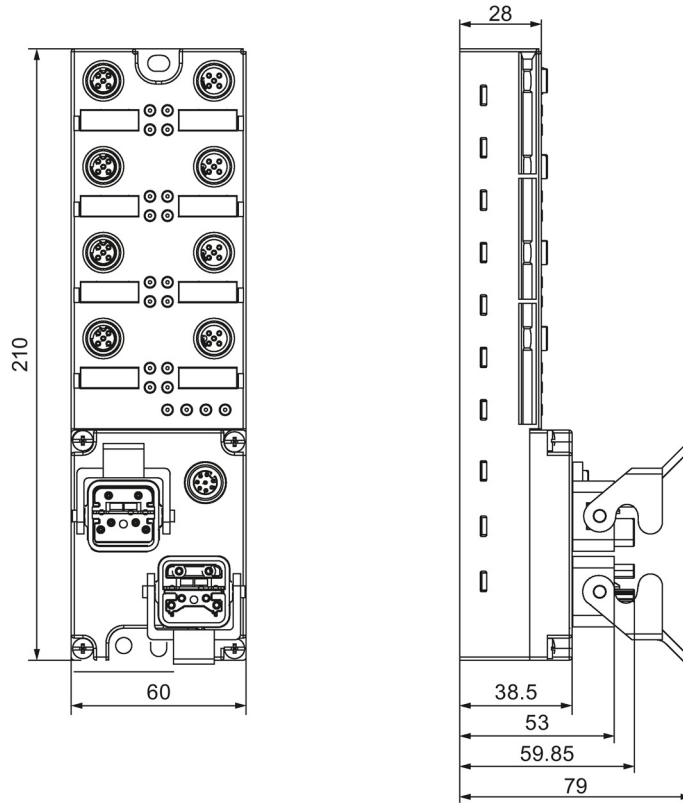


Figure A-2 Dimension drawing of the I/O module installed with ECOFAST terminal block

A.3 I/O address space

I/O module 8 DI

Assignment in the process image of inputs per module:

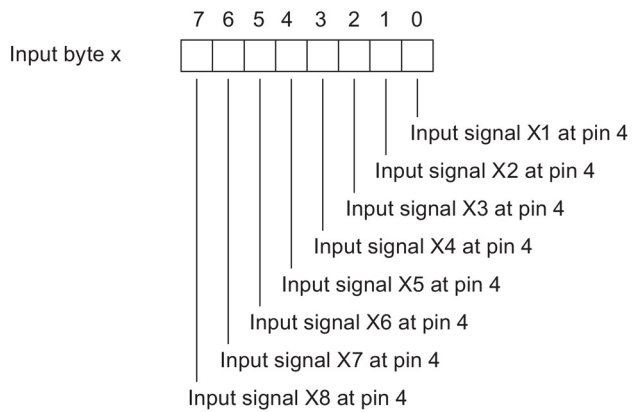


Figure A-3 Address space of I/O module 8 DI

I/O module 16 DI

Assignment in the process image of inputs per module:

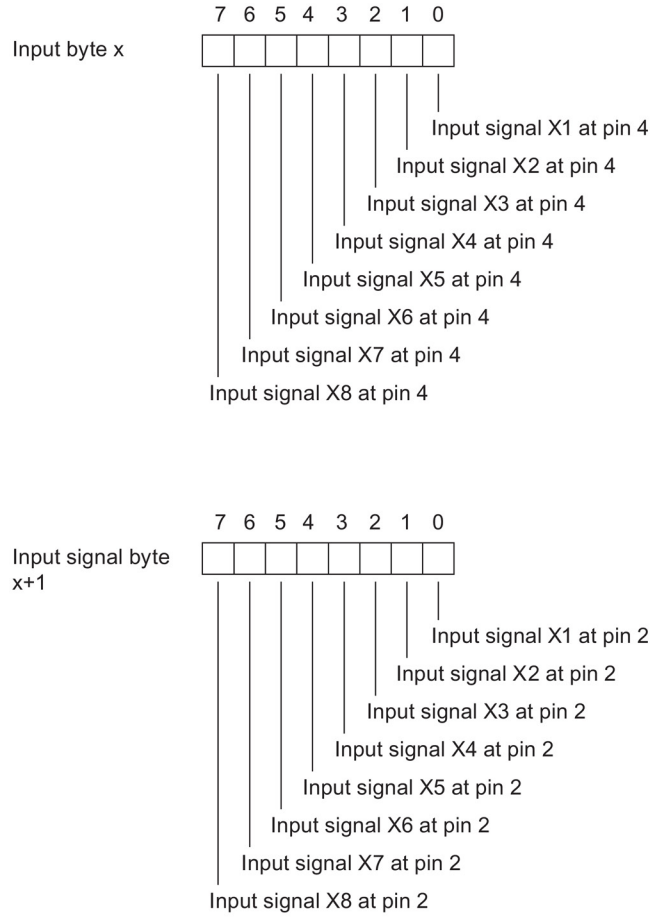


Figure A-4 Address space of I/O module 16 DI

I/O module 8 DO 2A

Assignment in the process image of outputs per module:

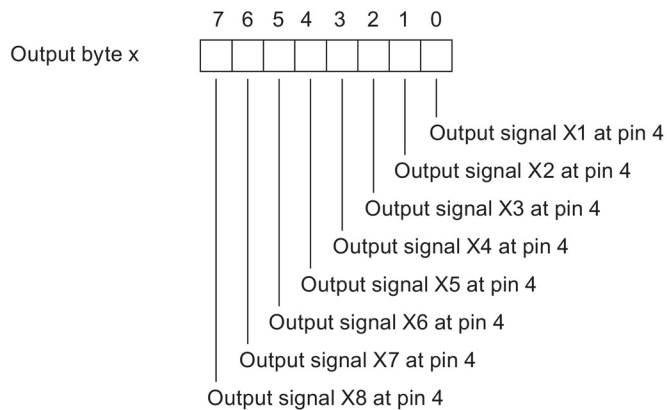


Figure A-5 Address space of I/O module 8 DO 2A

I/O module 16 DO 0.5A

Assignment in the process image of outputs per module:

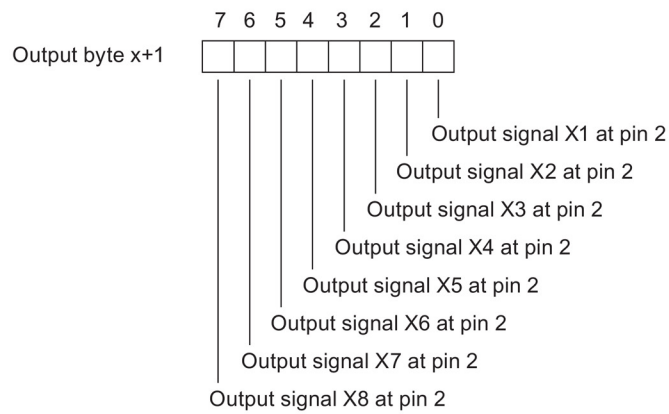
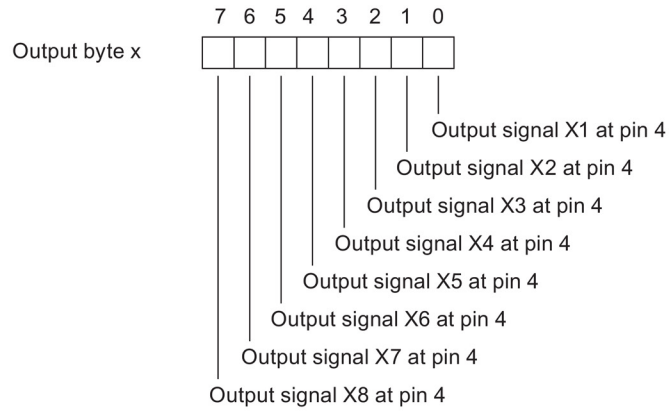


Figure A-6 Address space of I/O module 16 DO 0.5A

I/O module 8 DI / 8 DO 2A

Assignment in the I/O process image per module:

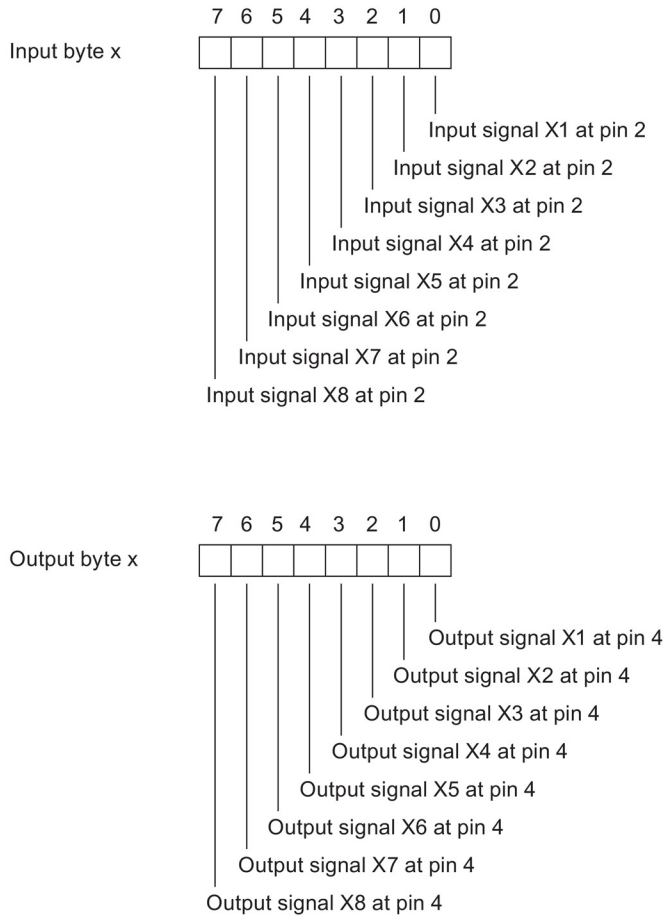


Figure A-7 Address space of I/O module 8 DI / 8 DO 2A:

I/O module 8 DI / 8 DO 1.3A

Assignment in the I/O process image per module:

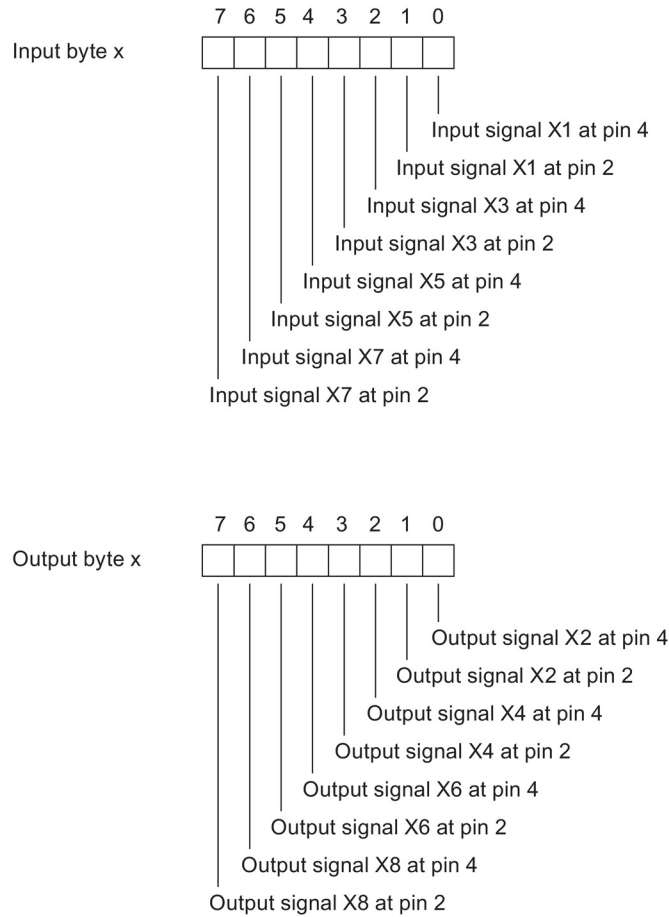


Figure A-8 Address space of I/O module 8 DI / 8 DO 1.3A:

Glossary

ECOFAST

(Energy and **C**ommunication **F**ield **I**nstallation **S**ystem) System for the extensive decentralization and modularization of the installation and comprehensive diagnostics on the component level.

ET 200eco

Distributed I/O device with block I/Os structural-design technology.

Grounding

Grounding involves connecting an electrically conductive part with the ground electrode via a metallic conductor.

I/O module

Sensors and actuators are connected via a coupler plug or Y-connector to the I/O module.

PE sheath

Cable with sheath (protective covering) made of polyethylene (PE)

PE sheath

Cable with sheath (protective covering) made of polyethylene (PE)

T functionality

This functionality is integrated in each terminal block and loops the PROFIBUS DP and the voltage supply through to the next PROFIBUS node.

Result: If you remove the terminal block during operation, the downstream PROFIBUS nodes will not fail.

Terminal block

Pluggable module for switching the connection method. Available in ECOFAST versions and M12, 7/8".

Voltage designations ECOFAST

Alternative voltage designations for ECOFAST:

- Electronic / Sensor supply (1L+) = Load voltage not connected (l.v.)
- Load voltage supply (2L+) = connected load voltage (V)

Index

2

24 V DC supply, 20

A

Additional support, 4

Article numbers, 95

Technical reference to PROFIBUS DP with
SIMATIC S7 and STEP 7, 101

B

Base module BM 141-ECOFAST 8DI

Technical specifications, 68

Basic knowledge requirements, 3

Burst pulses, 61

C

CE Label, 60

Climatic environmental conditions, 63

Commissioning, 47

Components and protective measures, 21

Configuration, 47

electrical, 24

ET 200eco, 47

Continuous shock, 64

D

Definition

Electromagnetic compatibility, 61

Station status, 56

Diagnostics, 47

Disabling, 53

ID-specific, 59

Reading, 53

with STEP 7, 53

Diagnostics by LED Display, 50

Dimension drawings, 102

Disposal, 4

DP master, 8

DP slave, 8

Dual connection

of actuators/sensors, 33

E

ECOFAST connectors

Connecting, 39

Wiring, 38

Electrical configuration, 24

Electrical isolation

between..., 23

Electromagnetic compatibility, 61

Electrostatic discharge, 61

EMC, 61

EMERGENCY OFF equipment, 20

Emission of radio interference, 62

ET 200eco, 21, 23, 47

Configuration, 47

operating on grounded mains, 21, 23

Status and error displays, 51

ET 200eco components, 11

ET 200eco Distributed I/O System

Definition, 10, 11

Field of application, 10

View, 10

F

FB 230, 53

Field of application, 8

Fuse

external, 26

G

General rules, 20

Grounded mains, 21

GSD file, 47

Guide

to the manual, 4

I

I/O module 16 DI

Block diagram, 76

Pin assignment:digital inputs, 75, 75

- Terminal assignment of the M12 circular connector, 30
- Terminal assignment of the Y-connector, 35
- I/O module 16 DO 0.5A
 - Block diagram, 84
 - Pin assignment:digital inputs, 83, 83
 - Terminal assignment of the M12 circular connector, 31
 - Terminal assignment of the Y-connector, 35
- I/O module 8 DI
 - Block diagram, 72
 - Pin assignment:digital inputs, 71, 71
 - Terminal assignment of the M12 circular connector, 29
- I/O module 8 DI / 8 DO 1.3A
 - Block diagram, 92
 - Pin assignment:digital inputs, 91, 91
 - Terminal assignment of the M12 circular connector, 32
 - Terminal assignment of the Y-connector, 36
- I/O module 8 DI / 8 DO 2A
 - Block diagram, 88
 - Pin assignment:digital inputs, 87, 87
 - Terminal assignment of the Y-connector, 36
- I/O module 8 DO / 8 DI 2A
 - Terminal assignment of the M12 circular connector, 31
- I/O module 8 DO 2A
 - Block diagram, 80
 - Pin-out, 79, 79
 - Terminal assignment of the M12 circular connector, 30
- ID-specific diagnostics, 59
- IEC 204, 20
- IEC 61131-2, 60
- Installing, 13
- Insulation test, 65
- Integrating the GSD file in the configuration software, 47

M

- M12 connector
 - Connecting, 29
- M12, 7/8" terminal block
 - Wiring, 41
- Manual
 - Purpose, 3, 3
- Manufacturer ID
 - Configuration, 58
- Master PROFIBUS address
 - Configuration, 57

- Mechanical environmental conditions, 63
- Mounting dimensions, 12
- Mounting position, 12

O

- Overall configuration on TN-S mains, 23

P

- Pollution degree, 65
- PROFIBUS DP, 8, 9
 - Devices, 9
- PROFIBUS DP network
 - Configuration, 9
- PROFIBUS standard, 60
- Protection against external electrical interference, 21
- Protection class, 65
- Pulse-shaped disturbance, 61

R

- Rated voltage, 66
- Readership
 - of this manual, 4
- Recycling, 4
- Regulations, 20

S

- Safety isolation, 22
- Scope
 - of this manual, 3
- Setting the PROFIBUS address, 17
- SFC 13 DPNRM_DG, 53, 54
- Shipping conditions, 61
- Shock, 64
- Sinusoidal disturbance, 61
- Slave diagnostics, 53
 - Configuration of extended slave diagnostics, 55
- Specifications, 67
- Standard EN 50170, Volume 2, PROFIBUS, 9
- Standards and certifications, 60
- Startup of ET 200eco, 49
- Startup of the system after certain events, 20
- Station status
 - Configuration, 56
 - Definition, 56
- Status and error displays, 51
 - ET 200eco, 51

Storage conditions, 61
support
 additional, 4

T

Technical specifications
 Climatic environmental conditions, 63
 ECOFAST terminal block, 68
 Electromagnetic compatibility, 61
 I/O module 16 DI, 77
 I/O module 16 DO 0.5A, 85
 I/O module 8 DI, 73
 I/O module 8 DI / 8 DO 1.3A, 93, 93
 I/O module 8 DI / 8 DO 2A, 89, 89
 I/O module 8 DO 2A, 81
 M12, 7/8" terminal block, 70
 Mechanical environmental conditions, 63
 Shipping and storage conditions, 61
Temperature, 62
Terminating resistor, 40, 44
Test voltage, 65
TN-S mains, 23

V

Vibration, 64

W

Wiring
 Procedure, 27
Wiring, 20

Y

Y-connector, 33
 Connecting, 34